

CM901-B

COM Express Basic Module User's Manual

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Trademarks

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COM Express Specification Reference

PICMG® COM Express Module™ Base Specification.

<http://www.picmg.org/>

FCC and DOC Statement on Class B

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio TV technician for help.

Notice:

1. The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
2. Shielded interface cables must be used in order to comply with the emission limits.

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About this Manual

An electronic file of this manual is included in the CD. To view the user's manual in the CD, insert the CD into a CD-ROM drive. The autorun screen (Main Board Utility CD) will appear. Click "User's Manual" on the main menu.

Warranty

1. Warranty does not cover damages or failures that arise from misuse of the product, inability to use the product, unauthorized replacement or alteration of components and product specifications.
2. The warranty is void if the product has been subjected to physical abuse, improper installation, modification, accidents or unauthorized repair of the product.
3. Unless otherwise instructed in this user's manual, the user may not, under any circumstances, attempt to perform service, adjustments or repairs on the product, whether in or out of warranty. It must be returned to the purchase point, factory or authorized service agency for all such work.
4. We will not be liable for any indirect, special, incidental or consequential damages to the product that has been modified or altered.

Static Electricity Precautions

It is quite easy to inadvertently damage your PC, system board, components or devices even before installing them in your system unit. Static electrical discharge can damage computer components without causing any signs of physical damage. You must take extra care in handling them to ensure against electrostatic build-up.

1. To prevent electrostatic build-up, leave the system board in its anti-static bag until you are ready to install it.
2. Wear an antistatic wrist strap.
3. Do all preparation work on a static-free surface.
4. Hold the device only by its edges. Be careful not to touch any of the components, contacts or connections.
5. Avoid touching the pins or contacts on all modules and connectors. Hold modules or connectors by their ends.



Important:

Electrostatic discharge (ESD) can damage your processor, disk drive and other components. Perform the upgrade instruction procedures described at an ESD workstation only. If such a station is not available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the system chassis. If a wrist strap is unavailable, establish and maintain contact with the system chassis throughout any procedures requiring ESD protection.

Safety Measures

To avoid damage to the system:

- Use the correct AC input voltage range.

To reduce the risk of electric shock:

- Unplug the power cord before removing the system chassis cover for installation or servicing. After installation or servicing, cover the system chassis before plugging the power cord.

About the Package

The package contains the following items. If any of these items are missing or damaged, please contact your dealer or sales representative for assistance.

- One CM901-B board
- One DVD
- One QR (Quick Reference)

Optional Items

- COM331-B carrier board kit
- Cable kit for carrier board
- Heat spreader: TBD
- Heat spreader with heat sink and fan: TBD
- Heat sink with fan: TBD

The board and accessories in the package may not come similar to the information listed above. This may differ in accordance with the sales region or models in which it was sold. For more information about the standard package in your region, please contact your dealer or sales representative.

Before Using the System Board

Before using the system board, prepare basic system components.

If you are installing the system board in a new system, you will need at least the following internal components.

- A CPU
- Memory module
- Storage devices such as hard disk drive, CD-ROM, etc.

You will also need external system peripherals you intend to use which will normally include at least a keyboard, a mouse and a video display monitor.

Chapter 1 - Introduction

Specifications

Processor	<ul style="list-style-type: none"> • AMD® Embedded R-Series APUs <ul style="list-style-type: none"> : R-464L Quad-core 2.3GHz, 35W : R-460H Quad-core 1.9GHz, 35W : R-272F Dual-core 2.7GHz, 35W : R-268D Dual-core 2.5GHz, 35W • PGA (FS1r2) socket • 32nm process technology
Chipset	<ul style="list-style-type: none"> • AMD® A70M Fusion Controller Hub
System Memory	<ul style="list-style-type: none"> • Two 204-pin DDR3 SODIMM sockets • Supports DDR3 (1.5V), LVDDR3 (1.35V), ULVDDR3 (1.25V) up to 1600MHz • Supports dual channel memory interface • Supports up to 16GB system memory • DRAM device technologies: 1Gb, 2Gb, 4Gb and 8Gb DDR3 DRAM technologies are supported for x8 and x16 devices, unbuffered, non-ECC
Graphics	<ul style="list-style-type: none"> • Supports VGA and LVDS interfaces • VGA display resolution up to 1920x1600 pixels at a refresh rate of 60Hz • LVDS: Single Channel - 18/24-bit; Dual Channel: 36/48-bit
Audio	<ul style="list-style-type: none"> • Supports High Definition Audio interface
LAN	<ul style="list-style-type: none"> • Intel® 82574L Gigabit Ethernet controller • Integrated 10/100/1000 transceiver • Fully compliant with IEEE 802.3, IEEE 802.3u, IEEE 802.3ab
Serial ATA	<ul style="list-style-type: none"> • Supports 4 Serial ATA interfaces • 4 SATA 3.0 with data transfer rate up to 6Gb/s • Integrated Advanced Host Controller Interface (AHCI) controller • Supports RAID 0/1
USB Interface	<ul style="list-style-type: none"> • XHCI Host Controller supports up to 4 super speed USB 3.0 ports
Digital Display Interface (DDI)	<ul style="list-style-type: none"> • 3 Digital Display Interface <ul style="list-style-type: none"> - DDI1 supports pure DisplayPort - DDI2 supports DisplayPort or switched to LVDS - DDI3 supports DisplayPort or switched to VGA

Watchdog Timer	<ul style="list-style-type: none"> • Watchdog timeout programmable via software from 1 to 255 seconds
SSD (optional)	<ul style="list-style-type: none"> • 4GB/8GB/16GB/32GB • Write: 30MB/sec (max), Read: 70MB/sec (max) • SATA to SSD onboard
Trusted Platform Module (TPM) - optional	<ul style="list-style-type: none"> • Provides a Trusted PC for secure transactions • Provides software license protection, enforcement and password protection
Expansion Interfaces	<ul style="list-style-type: none"> • Supports 8 USB 2.0 ports (first 4 USB ports support USB 3.0) • Supports 1 PCIe x16 interface • Supports 7 PCIe x1 interfaces (the first 4 PCIe x1 can be configured to PCIe x4) • Supports 3 Digital Display Interface • Supports LPC interface • Supports 8-bit Digital I/O (4 In, 4 Out)
Damage Free Intelligence	<ul style="list-style-type: none"> • Monitors APU temperature • Monitors APU fan speed • Monitors APU_VDD/APU_VDDNB/APU_VDDIO_SUS/1V2/1V1 voltages • Watchdog timer function
BIOS	<ul style="list-style-type: none"> • 32Mbit SPI BIOS
Temperature	<ul style="list-style-type: none"> • Operating: 0°C to 60°C • Storage: -40°C to 85°C
Humidity	<ul style="list-style-type: none"> • 10% to 90%
Power Consumption	<ul style="list-style-type: none"> • 31.12 W with R-464L at 2.3GHz and 2x 1 GB DDR3 SODIMM
Power	<ul style="list-style-type: none"> • Input: 12V, 5VSB (optional), VCC_RTC
Regulatory	<ul style="list-style-type: none"> • EMC: CE, FCC Part 15 Class B, RoHs
PCB	<ul style="list-style-type: none"> • Dimensions <ul style="list-style-type: none"> - COM Express® Basic - 95mm (3.74") x 125mm (4.9") • Compliance <ul style="list-style-type: none"> - PICMG COM Express® R2.1, Type 6

Features

• Watchdog Timer

The Watchdog Timer function allows your application to regularly “clear” the system at the set time interval. If the system hangs or fails to function, it will reset at the set time interval so that your system will continue to operate.

• DDR3

DDR3 delivers increased system bandwidth and improved performance. The advantages of DDR3 are its higher bandwidth and its increase in performance at a lower power than DDR2.

• Graphics

The AMD Embedded R-Series platform delivers high-performance processing coupled with a premium high-definition visual experience in a power-efficient solution. Enabling unprecedented integrated graphics and multi-display capabilities in embedded applications that can be compact and low-power. Supports 3 Digital Display Interface: DD11 supports pure DisplayPort, DD12 supports DisplayPort or switched to LVDS, and DD13 supports DisplayPort or switched to VGA.

• Serial ATA

Serial ATA is a storage interface that is compliant with SATA 1.0a specification. With speed of up to 3Gb/s (SATA 2.0) and 6Gb/s (SATA 3.0), it improves hard drive performance faster than the standard parallel ATA whose data transfer rate is 100MB/s. The bandwidth of the SATA 3.0 will be limited by carrier board design.

• Gigabit LAN

The Intel 82574L Gigabit LAN controller supports up to 1Gbps data transmission.

• USB

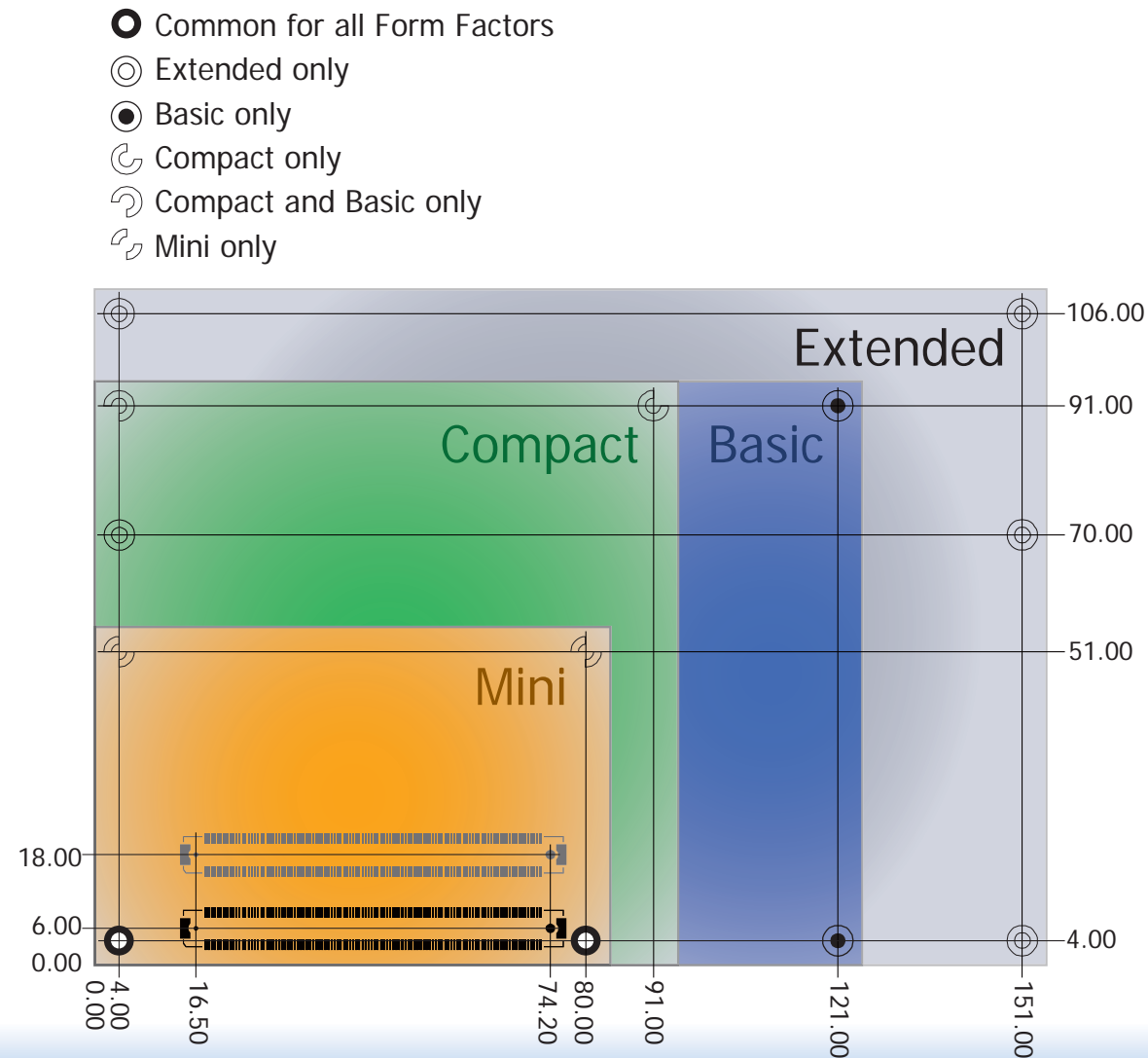
The system board supports the new USB 3.0. It is capable of running at a maximum transmission speed of up to 5 Gbit/s (625 MB/s) and is faster than USB 2.0 (480 Mbit/s, or 60 MB/s) and USB 1.1 (12Mb/s). USB 3.0 reduces the time required for data transmission, reduces power consumption, and is backward compatible with USB 2.0. It is a marked improvement in device transfer speeds between your computer and a wide range of simultaneously accessible external Plug and Play peripherals.

Chapter 2 - Concept

COM Express Module Standards

The figure below shows the dimensions of the different types of COM Express modules.

CM901-B is a COM Express Basic module. The dimension is 95mm x 125mm.



Specification Comparison Table

The table below shows the COM Express standard specifications and the corresponding specifications supported on the CM901-B module.

Connector	Feature	COM Express Module Base Specification Type 6 (No IDE or PCI, add DDI + USB3) Min / Max	DFI CM901-B Type 6
A-B	System I/O		
A-B	PCI Express Lanes 0 - 5	1 / 6	6
A-B	LVDS Channel A	0 / 1	1
A-B	LVDS Channel B	0 / 1	1
A-B	eDP on LVDS CH A pins	0 / 1	0
A-B	VGA Port	0 / 1	1
A-B	TV-Out	NA	NA
A-B	DDI 0	NA	NA
A-B ⁵	Serial Ports 1 - 2	0 / 2	2
A-B	CAN interface on SER1	0 / 1	0
A-B	SATA / SAS Ports	1 / 4	4
A-B	AC'97 / HDA Digital Interface	0 / 1	1
A-B	USB 2.0 Ports	4 / 8	8
A-B	USB Client	0 / 1	0
A-B	USB 3.0 Ports	NA	NA
A-B	LAN Port 0	1 / 1	1
A-B	Express Card Support	1 / 2	2
A-B	LPC Bus	1 / 1	1
A-B	SPI	1 / 2	1
A-B	System Management		
A-B ⁶	SDIO (muxed on GPIO)	0 / 1	1 (optional)
A-B ⁶	General Purpose I/O	8 / 8	8
A-B	SMBus	1 / 1	1
A-B	I2C	1 / 1	1
A-B	Watchdog Timer	0 / 1	1
A-B	Speaker Out	1 / 1	1
A-B	External BIOS ROM Support	0 / 2	1
A-B	Reset Functions	1 / 1	1



Note:

- 5 Indicates 12V-tolerant features on former VCC_12V signals.
- 6 Cells in the connected columns spanning rows provide a rough approximation of features sharing connector pins.

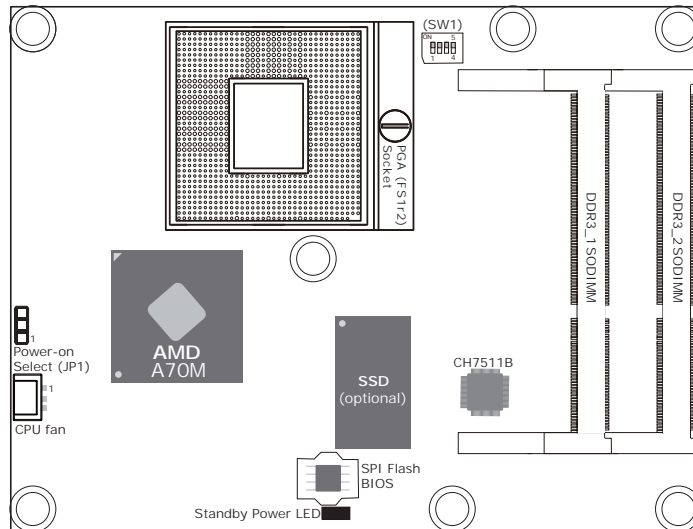
Connector	Feature	COM Express Module Base Specification Type 6 (No IDE or PCI, add DDI + USB3) Min / Max	DFI CM901-B Type 6
A-B	Power Management		
A-B	Thermal Protection	0 / 1	1
A-B	Battery Low Alarm	0 / 1	1
A-B	Suspend/Wake Signals	0 / 3	2
A-B	Power Button Support	1 / 1	1
A-B	Power Good	1 / 1	1
A-B	VCC_5V_SBY Contacts	4 / 4	4
A-B ⁵	Sleep Input	0 / 1	1
A-B ⁵	Lid Input	0 / 1	0
A-B ⁵	Fan Control Signals	0 / 2	2
A-B	Trusted Platform Modules	0 / 1	1 (optional)
A-B	Power		
A-B	VCC_12V Contacts	12 / 12	12

Module Pin-out - Required and Optional Features C-D Connector. PICMG® COM.0Revision 2.1

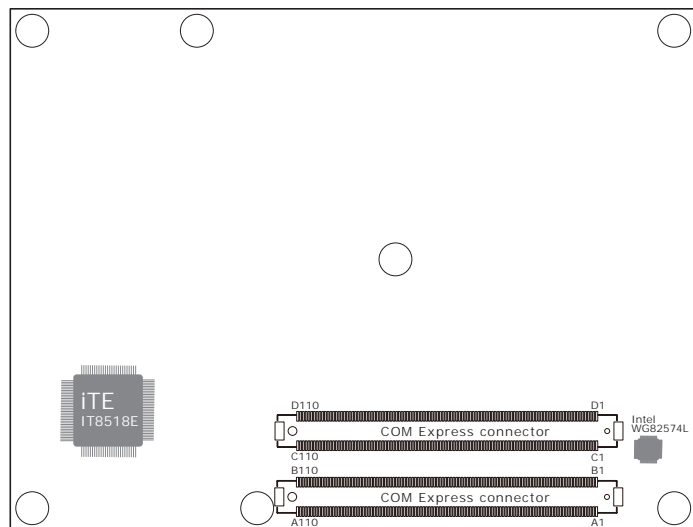
Connector	Feature	COM Express Module Base Specification Type 6 (No IDE or PCI, add DDI + USB3) Min / Max	DFI CM901-B Type 6
C-D	System I/O		
C-D ⁶	PCI Express Lanes 16 - 31	0 / 16	16
	PCI Express Graphics (PEG)	0 / 1	1
	Muxed SDVO Channels 1 - 2	NA	NA
	PCI Express Lanes 6 - 15	0 / 2	1
	PCI Bus - 32 Bit	NA	NA
	PATA Port	NA	NA
C-D ⁶	LAN Ports 1 - 2	NA	NA
	DDIs 1 - 3	0 / 3	3
	USB 3.0 Ports	0 / 4	4
C-D	Power		
C-D	VCC_12V Contacts	12 / 12	12

Chapter 3 - Hardware Installation

Board Layout

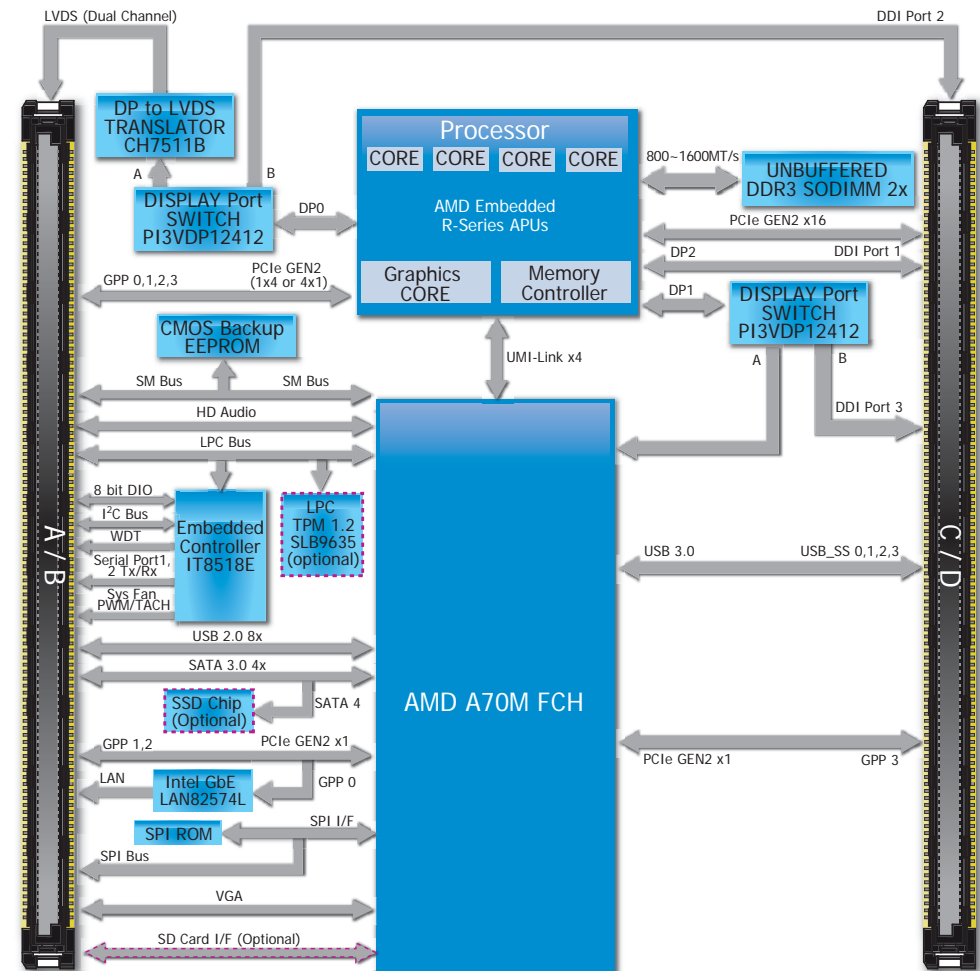


Top View



Bottom View

Block Diagram



**Important:**

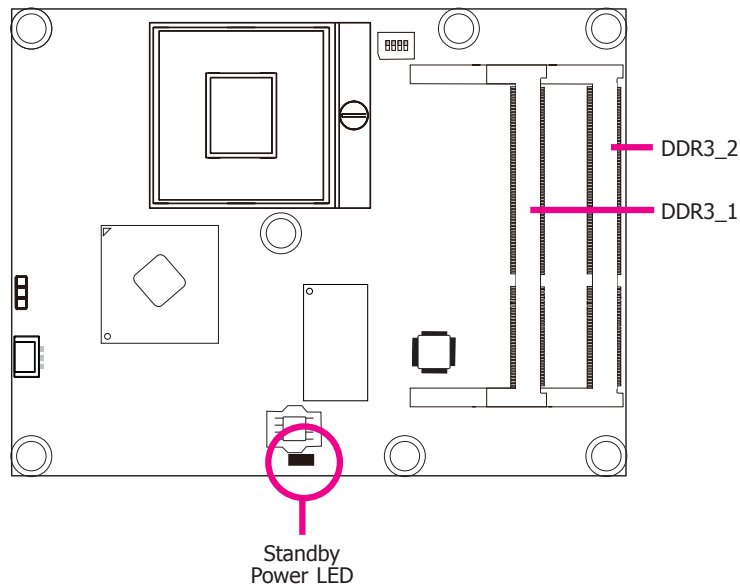
Electrostatic discharge (ESD) can damage your board, processor, disk drives, add-in boards, and other components. Perform installation procedures at an ESD workstation only. If such a station is not available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the system chassis. If a wrist strap is unavailable, establish and maintain contact with the system chassis throughout any procedures requiring ESD protection.

System Memory

The system board is equipped with two 204-pin SODIMM sockets that support DDR3 memory modules.

**Important:**

When the Standby Power LED lit red, it indicates that there is power on the system board. Power-off the PC then unplug the power cord prior to installing any devices. Failure to do so will cause severe damage to the motherboard and components.

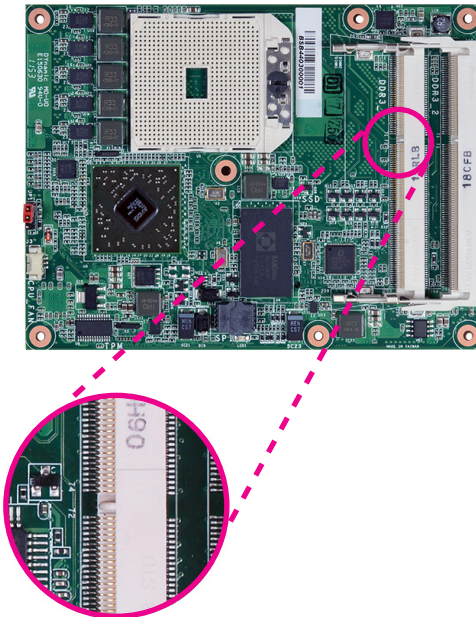


Installing the DIMM Module


Note:

The system board used in the following illustrations may not resemble the actual board. These illustrations are for reference only.

1. Make sure the PC and all other peripheral devices connected to it has been powered down.
2. Disconnect all power cords and cables.
3. Locate the SODIMM socket on the system board.
4. Note the key on the socket. The key ensures the module can be plugged into the socket in only one direction.



5. Grasping the module by its edges, align the module into the socket at an approximately 30 degrees angle. Apply firm even pressure to each end of the module until it slips down into the socket. The contact fingers on the edge of the module will almost completely disappear inside the socket.



6. Push down the module until the clips at each end of the socket lock into position. You will hear a distinctive "click", indicating the module is correctly locked into position.



CPU

Overview

The system board is equipped with a surface mount rPGA 988B CPU socket.

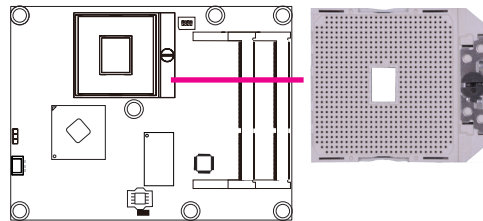


Note:

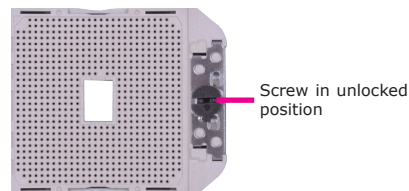
The system board used in the following illustrations may not resemble the actual board. These illustrations are for reference only.

Installing the CPU

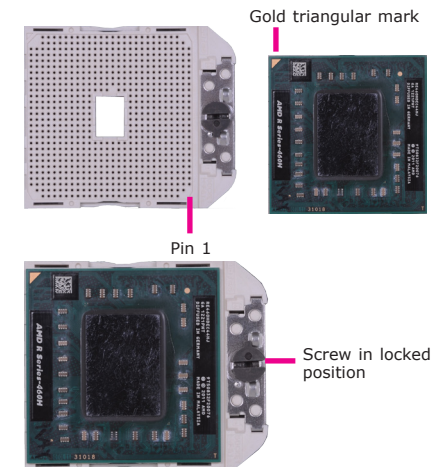
1. Make sure the PC and all other peripheral devices connected to it has been powered down.
2. Disconnect all power cords and cables.
3. Locate the FS1r2 (722-pin lidless micro PGA) socket on the board.



4. Make sure the screw is in its unlock position. If it's not, use a screwdriver to turn the screw to its unlock position.



5. Position the CPU above the socket. The gold triangular mark on the CPU must align with pin 1 of the CPU socket.



Important:

Handle the CPU by its edges and avoid touching the pins.

6. Insert the CPU into the socket until it is seated in place. The CPU will fit in only one orientation and can easily be inserted without exerting any force. Use a screwdriver to turn the screw to its lock position.

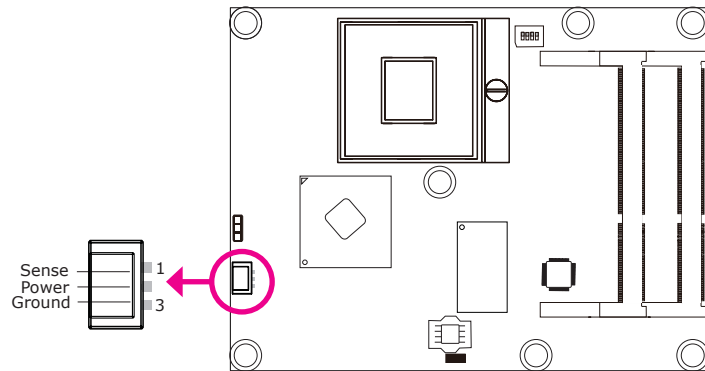


Important:

Do not force the CPU into the socket. Forcing the CPU into the socket may bend the pins and damage the CPU.

Connectors

CPU Fan Connector



Connect the CPU fan's cable connector to the CPU fan connector on the board. The cooling fan will provide adequate airflow throughout the chassis to prevent overheating the CPU and board components.

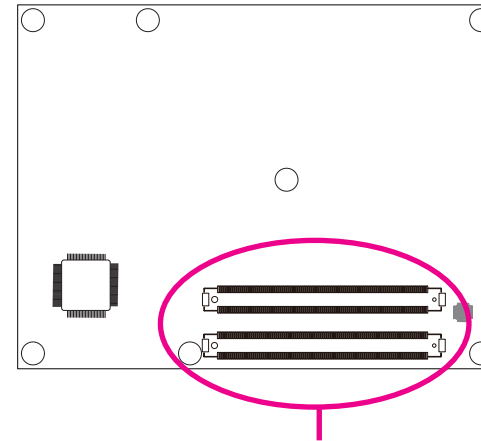
BIOS Setting

"Module Board H/W Monitor" submenu in the Advanced menu of the BIOS will display the current speed of the cooling fan. Refer to chapter 3 of the manual for more information.

COM Express Connectors

The COM Express connectors are used to interface the CM901-B COM Express board to a carrier board. Connect the COM Express connectors (located on the solder side of the board) to the COM Express connectors on the carrier board.

Refer to the "Installing CM901-B onto a Carrier Board" section for more information.



COM Express Connectors

Refer to the following pages for the pin functions of these connectors.

COM Express Connectors

RowA		RowB		RowA		RowB		RowC		RowD		RowC		RowD	
A1	GND (FIXED)	B1	GND (FIXED)	A56	PCIE TX4-	B56	PCIE RX4-	C1	GND (FIXED)	D1	GND (FIXED)	C56	PEG RX1-	D56	PEG TX1-
A2	GBE0 MDI3-	B2	GBE0 ACT#	A57	GND	B57	GPO2	C2	GND	D2	GND	C57	TYPE1#	D57	TYPE2#
A3	GBE0 MDI3+	B3	LPC FRAME#	A58	PCIE TX3+	B58	PCIE RX3+	C3	USB SSRX0-	D3	USB SSTX0-	C58	PEG RX2+	D58	PEG TX2+
A4	GBE0 LINK100#	B4	LPC AD0	A59	PCIE TX3-	B59	PCIE RX3-	C4	USB SSRX0+	D4	USB SSTX0+	C59	PEG RX2-	D59	PEG TX2-
A5	GBE0 LINK1000#	B5	LPC AD1	A60	GND (FIXED)	B60	GND (FIXED)	C5	GND	D5	GND	C60	GND (FIXED)	D60	GND (FIXED)
A6	GBE0 MDI2-	B6	LPC AD2	A61	PCIE TX2+	B61	PCIE RX2+	C6	USB SSRX1-	D6	USB SSTX1-	C61	PEG RX3+	D61	PEG TX3+
A7	GBE0 MDI2+	B7	LPC AD3	A62	PCIE TX2-	B62	PCIE RX2-	C7	USB SSRX1+	D7	USB SSTX1+	C62	PEG RX3-	D62	PEG TX3-
A8	GBE0 LINK#	B8	LPC DRQ0#	A63	GPI1	B63	GPO3	C8	GND	D8	GND	C63	RSVD	D63	RSVD
A9	GBE0 MDI1-	B9	LPC DRQ1#	A64	PCIE TX1+	B64	PCIE RX1+	C9	USB SSRX2-	D9	USB SSTX2-	C64	RSVD	D64	RSVD
A10	GBE0 MDI1+	B10	LPC CLK	A65	PCIE TX1-	B65	PCIE RX1-	C10	USB SSRX2+	D10	USB SSTX2+	C65	PEG RX4+	D65	PEG TX4+
A11	GND (FIXED)	B11	GND (FIXED)	A66	GND	B66	WAKE0#	C11	GND (FIXED)	D11	GND (FIXED)	C66	PEG RX4-	D66	PEG TX4-
A12	GBE0 MDI0-	B12	PWRBTN#	A67	GPI2	B67	WAKE1#	C12	USB SSRX3-	D12	USB SSTX3-	C67	NC	D67	GND
A13	GBE0 MDI0+	B13	SMB CK	A68	PCIE TX0+	B68	PCIE RX0+	C13	USB SSRX3+	D13	USB SSTX3+	C68	PEG RX5+	D68	PEG TX5+
A14	GBE0 CTREF	B14	SMB DAT	A69	PCIE TX0-	B69	PCIE RX0-	C14	GND	D14	GND	C69	PEG RX5-	D69	PEG TX5-
A15	SUS S3#	B15	SMB ALERT#	A70	GND (FIXED)	B70	GND (FIXED)	C15	NC	D15	DDI1 CTRLCLK AUX	C70	GND (FIXED)	D70	GND (FIXED)
A16	SATA0 TX+	B16	SATA1 TX+	A71	LVDS A0+	B71	LVDS B0+	C16	NC	D16	DDI1 CTRLDATA A	C71	PEG RX6+	D71	PEG TX6+
A17	SATA0 TX-	B17	SATA1 TX-	A72	LVDS A0-	B72	LVDS B0-	C17	RSVD	D17	RSVD	C72	PEG RX6-	D72	PEG TX6-
A18	SUS S4#	B18	SUS_STAT#	A73	LVDS A1+	B73	LVDS B1+	C18	RSVD	D18	RSVD	C73	GND	D73	GND
A19	SATA0 RX+	B19	SATA1 RX+	A74	LVDS A1-	B74	LVDS B1-	C19	PCIE RX6+	D19	PCIE TX6+	C74	PEG RX7+	D74	PEG TX7+
A20	SATA0 RX-	B20	SATA1 RX-	A75	LVDS A2+	B75	LVDS B2+	C20	PCIE RX6-	D20	PCIE TX6-	C75	PEG RX7-	D75	PEG TX7-
A21	GND (FIXED)	B21	GND (FIXED)	A76	LVDS A2-	B76	LVDS B2-	C21	GND (FIXED)	D21	GND (FIXED)	C76	GND	D76	GND
A22	SATA2 TX+	B22	SATA3 TX+	A77	LVDS VDD EN	B77	LVDS B3+	C22	NC	D22	NC	C77	RSVD	D77	RSVD
A23	SATA2 TX-	B23	SATA3 TX-	A78	LVDS A3+	B78	LVDS B3-	C23	NC	D23	NC	C78	PEG RX8+	D78	PEG TX8+
A24	SUS S5#	B24	PWR OK	A79	LVDS A3-	B79	LVDS BKLT EN	C24	DDI1 HPD	D24	RSVD	C79	PEG RX8-	D79	PEG TX8-
A25	SATA2 RX+	B25	SATA3 RX+	A80	GND (FIXED)	B80	GND (FIXED)	C25	NC	D25	RSVD	C80	GND (FIXED)	D80	GND (FIXED)
A26	SATA2 RX-	B26	SATA3 RX-	A81	LVDS A CK+	B81	LVDS B CK+	C26	NC	D26	DDI1 PAIR0+	C81	PEG RX9+	D81	PEG TX9+
A27	BATLOW#	B27	WDT	A82	LVDS A CK-	B82	LVDS B CK-	C27	RSVD	D27	DDI1 PAIR0-	C82	PEG RX9-	D82	PEG TX9-
A28	(SATA ACT#	B28	AC SDIN2	A83	LVDS I2C CK	B83	LVDS BKLT CTRL	C28	RSVD	D28	RSVD	C83	RSVD	D83	RSVD
A29	AC/HDA SYNC	B29	AC SDIN1	A84	LVDS I2C DAT	B84	VCC 5V SBY	C29	NC	D29	DDI1 PAIR1+	C84	GND	D84	GND
A30	AC/HDA_RST#	B30	AC SDIN0	A85	GPI3	B85	VCC 5V SBY	C30	NC	D30	DDI1 PAIR1-	C85	PEG RX10+	D85	PEG TX10+
A31	GND (FIXED)	B31	GND (FIXED)	A86	RSVD	B86	VCC 5V SBY	C31	GND (FIXED)	D31	GND (FIXED)	C86	PEG RX10-	D86	PEG TX10-
A32	AC/HDA_BITCLK	B32	SPKR	A87	RSVD	B87	VCC 5V SBY	C32	DDI2 CTRLCLK AUX	D32	DDI1 PAIR2+	C87	GND	D87	GND
A33	AC/HDA_SDOUT	B33	I2C CK	A88	PCIE0 CK REF+	B88	BIOS DIS1#	C33	DDI2 CTRLDATA AU	D33	DDI1 PAIR2-	C88	PEG RX11+	D88	PEG TX11+
A34	BIOS_DIS0#	B34	I2C DAT	A89	PCIE0 CK REF-	B89	VGA RED	C34	RSVD	D34	RSVD	C89	PEG RX11-	D89	PEG TX11-
A35	THRMTRIP#	B35	THRM#	A90	GND (FIXED)	B90	GND (FIXED)	C35	RSVD	D35	RSVD	C90	GND (FIXED)	D90	GND (FIXED)
A36	USB6-	B36	USB7-	A91	SPI POWER	B91	VGA GRN	C36	DDI3 CTRLCLK AUX	D36	DDI1 PAIR3+	C91	PEG RX12+	D91	PEG TX12+
A37	USB6+	B37	USB7+	A92	SPI MISO	B92	VGA BLU	C37	DDI3 CTRLDATA AU	D37	DDI1 PAIR3-	C92	PEG RX12-	D92	PEG TX12-
A38	USB 6_7_OC#	B38	USB 4_5_OC#	A93	GPO0	B93	VGA HSYNC	C38	RSVD	D38	RSVD	C93	GND	D93	GND
A39	USB4-	B39	USB5-	A94	SPI_CLK	B94	VGA VSYNC	C39	DDI3 PAIR0+	D39	DDI2 PAIR0+	C94	PEG RX13+	D94	PEG TX13+
A40	USB4+	B40	USB5+	A95	SPI_MOSI	B95	VGA_I2C CK	C40	DDI3 PAIR0-	D40	DDI2 PAIR0-	C95	PEG RX13-	D95	PEG TX13-
A41	GND (FIXED)	B41	GND (FIXED)	A96	TPM_PP	B96	VGA_I2C DAT	C41	GND (FIXED)	D41	GND (FIXED)	C96	GND	D96	GND
A42	USB2-	B42	USB3-	A97	TYPE10#	B97	SPI_CS#	C42	DDI3 PAIR1+	D42	DDI2 PAIR1+	C97	RSVD	D97	RSVD
A43	USB2+	B43	USB3+	A98	SER0_TX	B98	RSVD	C43	DDI3 PAIR1-	D43	DDI2 PAIR1-	C98	PEG RX14+	D98	PEG TX14+
A44	USB 2_3_OC#	B44	USB 0_1_OC#	A99	SER0_RX	B99	RSVD	C44	DDI3 HPD	D44	DDI2 HPD	C99	PEG RX14-	D99	PEG TX14-
A45	USB0-	B45	USB1-	A100	GND (FIXED)	B100	GND (FIXED)	C45	RSVD	D45	RSVD	C100	GND (FIXED)	D100	GND (FIXED)
A46	USB0+	B46	USB1+	A101	SER1_TX	B101	FAN_PWMOUT	C46	DDI3 PAIR2+	D46	DDI2 PAIR2+	C101	PEG RX15+	D101	PEG TX15+
A47	VCC_RTC	B47	EXCD1_PERST#	A102	SER1_RX	B102	FAN_TACHIN	C47	DDI3 PAIR2-	D47	DDI2 PAIR2-	C102	PEG RX15-	D102	PEG TX15-
A48	EXCD0_PERST#	B48	EXCD1_CPPE#	A103	LID#	B103	SLEEP#	C48	RSVD	D48	RSVD	C103	GND	D103	GND
A49	EXCD0_CPPE#	B49	SYS_RESET#	A104	VCC_12V	B104	VCC_12V	C49	DDI3 PAIR3+	D49	DDI2 PAIR3+	C104	VCC_12V	D104	VCC_12V
A50	LPC_SERIRQ	B50	CB_RESET#	A105	VCC_12V	B105	VCC_12V	C50	DDI3 PAIR3-	D50	DDI2 PAIR3-	C105	VCC_12V	D105	VCC_12V
A51	GND (FIXED)	B51	GND (FIXED)	A106	VCC_12V	B106	VCC_12V	C51	GND (FIXED)	D51	GND (FIXED)	C106	VCC_12V	D106	VCC_12V
A52	PCIE_TX5+	B52	PCIE_RX5+	A107	VCC_12V	B107	VCC_12V	C52	PEG_RX0+/-	D52	PEG_TX0+	C107	VCC_12V	D107	VCC_12V
A53	PCIE_TX5-	B53	PCIE_RX5-	A108	VCC_12V	B108	VCC_12V	C53	PEG_RX0-	D53	PEG_TX0-	C108	VCC_12V	D108	VCC_12V
A54	GPI0	B54	GPO1	A109	VCC_12V	B109	VCC_12V	C54	TYPE0#	D54	PEG_LANE_RV#	C109	VCC_12V	D109	VCC_12V
A55	PCIE_TX4+	B55	PCIE_RX4+	A110	GND (FIXED)	B110	GND (FIXED)	C55	PEG_RX1+	D55	PEG_TX1+	C110	GND (FIXED)	D110	GND (FIXED)

COM Express Connectors Signal Description

Pin Types

I Input to the Module
 O Output from the Module
 I/O Bi-directional input / output signal
 OD Open drain output

AC97/HDA Signals Descriptions

Signal	Pin#	Pin Type	Pwr Rail /Tolerance	PU/PD	Description
AC/HAD_RST#	A30	O CMOS	3.3V Suspend/3.3V		Reset output to CODEC, active low.
AC/HDA_SYNC	A29	O CMOS	3.3V/3.3V		Sample-synchronization signal to the CODEC(s).
AC/HDA_BITCLK	A32	I/O CMOS	3.3V/3.3V		Serial data clock generated by the external CODEC(s).
AC/HDA_SDOUT	A33	O CMOS	3.3V/3.3V		Serial TDM data output to the CODEC.
AC/HDA_SDIN2	B28	I/O CMOS	3.3V Suspend/3.3V		Serial TDM data inputs from up to 3 CODECs.
AC/HDA_SDIN1	B29	I/O CMOS	3.3V Suspend/3.3V		
AC/HDA_SDIN0	B30	I/O CMOS	3.3V Suspend/3.3V		

Gigabit Ethernet Signals Descriptions

Signal	Pin#	Pin Type	Pwr Rail /Tolerance	PU/PD	Description
GBE0_MDI0+	A13	I/O Analog	3.3V max Suspend		Gigabit Ethernet Controller 0: Media Dependent Interface Differential Pairs 0,1,2,3. The MDI can operate in 1000, 100 and 10 Mbit / sec modes. Some pairs are unused in some modes, per the following: <div style="display: flex; justify-content: space-around; font-family: monospace;"> 1000BASE-T 100BASE-TX 10BASE-T </div> <div style="display: flex; justify-content: space-around; font-family: monospace;"> MDI[0]+/- B1_DA+/- TX+/- TX+/- </div> <div style="display: flex; justify-content: space-around; font-family: monospace;"> MDI[1]+/- B1_DB+/- RX+/- RX+/- </div> <div style="display: flex; justify-content: space-around; font-family: monospace;"> MDI[2]+/- B1_DC+/- </div> <div style="display: flex; justify-content: space-around; font-family: monospace;"> MDI[3]+/- B1_DD+/- </div>
GBE0_MDI0-	A12	I/O Analog	3.3V max Suspend		
GBE0_MDI1+	A10	I/O Analog	3.3V max Suspend		
GBE0_MDI1-	A9	I/O Analog	3.3V max Suspend		
GBE0_MDI2+	A7	I/O Analog	3.3V max Suspend		
GBE0_MDI2-	A6	I/O Analog	3.3V max Suspend		
GBE0_MDI3+	A3	I/O Analog	3.3V max Suspend		
GBE0_MDI3-	A2	I/O Analog	3.3V max Suspend		
GBE0_ACT#	B2	OD CMOS	3.3V Suspend/3.3V		Gigabit Ethernet Controller 0 activity indicator, active low.
GBE0_LINK#	A8	OD CMOS	3.3V Suspend/3.3V		Gigabit Ethernet Controller 0 link indicator, active low.
GBE0_LINK100#	A4	OD CMOS	3.3V Suspend/3.3V		Gigabit Ethernet Controller 0 100 Mbit / sec link indicator, active low.
GBE0_LINK1000#	A5	OD CMOS	3.3V Suspend/3.3V		Gigabit Ethernet Controller 0 1000 Mbit / sec link indicator, active low.
GBE0_CTREF	A14	REF	GND min 3.3V max	1.9V	Reference voltage for Carrier Board Ethernet channel 0 magnetics center tap. The reference voltage is determined by the requirements of the Module PHY and may be as low as 0V and as high as 3.3V. The reference voltage output shall be current limited on the Module. In the case in which the reference

SATA Signals Descriptions

Signal	Pin#	Pin Type	Pwr Rail /Tolerance	PU/PD	Description
SATA0_TX+	A16	O SATA	AC coupled on Module		Serial ATA or SAS Channel 0 transmit differential pair.
SATA0_TX-	A17	O SATA	AC coupled on Module		
SATA0_RX+	A19	I SATA	AC coupled on Module		Serial ATA or SAS Channel 0 receive differential pair.
SATA0_RX-	A20	I SATA	AC coupled on Module		
SATA1_TX+	B16	O SATA	AC coupled on Module		Serial ATA or SAS Channel 1 transmit differential pair.
SATA1_TX-	B17	O SATA	AC coupled on Module		
SATA1_RX+	B19	I SATA	AC coupled on Module		Serial ATA or SAS Channel 1 receive differential pair.
SATA1_RX-	B20	I SATA	AC coupled on Module		
SATA2_TX+	A22	O SATA	AC coupled on Module		Serial ATA or SAS Channel 2 transmit differential pair.
SATA2_TX-	A23	O SATA	AC coupled on Module		
SATA2_RX+	A25	I SATA	AC coupled on Module		Serial ATA or SAS Channel 2 receive differential pair.
SATA2_RX-	A26	I SATA	AC coupled on Module		
SATA3_TX+	B22	O SATA	AC coupled on Module		Serial ATA or SAS Channel 3 transmit differential pair.
SATA3_TX-	B23	O SATA	AC coupled on Module		
SATA3_RX+	B25	I SATA	AC coupled on Module		Serial ATA or SAS Channel 3 receive differential pair.
SATA3_RX-	B26	I SATA	AC coupled on Module		
ATA_ACT#	A28	I/O CMOS	3.3V / 3.3V		ATA (parallel and serial) or SAS activity indicator, active low.

PCI Express Lanes Signals Descriptions

Signal	Pin#	Pin Type	Pwr Rail /Tolerance	PU/PD	Description
PCIE_TX0+	A68	O PCIE	AC coupled on Module		PCI Express Differential Transmit Pairs 0
PCIE_TX0-	A69				
PCIE_RX0+	B68	I PCIE	AC coupled off Module		PCI Express Differential Receive Pairs 0
PCIE_RX0-	B69				
PCIE_TX1+	A64	O PCIE	AC coupled on Module		PCI Express Differential Transmit Pairs 1
PCIE_TX1-	A65				
PCIE_RX1+	B64	I PCIE	AC coupled off Module		PCI Express Differential Receive Pairs 1
PCIE_RX1-	B65				
PCIE_TX2+	A61	O PCIE	AC coupled on Module		PCI Express Differential Transmit Pairs 2
PCIE_TX2-	A62				
PCIE_RX2+	B61	I PCIE	AC coupled off Module		PCI Express Differential Receive Pairs 2
PCIE_RX2-	B62				
PCIE_TX3+	A58	O PCIE	AC coupled on Module		PCI Express Differential Transmit Pairs 3
PCIE_TX3-	A59				
PCIE_RX3+	B58	I PCIE	AC coupled off Module		PCI Express Differential Receive Pairs 3
PCIE_RX3-	B59				
PCIE_TX4+	A55	O PCIE	AC coupled on Module		PCI Express Differential Transmit Pairs 4
PCIE_TX4-	A56				
PCIE_RX4+	B55	I PCIE	AC coupled off Module		PCI Express Differential Receive Pairs 4
PCIE_RX4-	B56				
PCIE_TX5+	A52	O PCIE	AC coupled on Module		PCI Express Differential Transmit Pairs 5
PCIE_TX5-	A53				
PCIE_RX5+	B52	I PCIE	AC coupled off Module		PCI Express Differential Receive Pairs 5
PCIE_RX5-	B53				
PCIE_TX6+	D19	O PCIE	AC coupled on Module		PCI Express Differential Transmit Pairs 6
PCIE_TX6-	D20				
PCIE_RX6+	C19	I PCIE	AC coupled off Module		PCI Express Differential Receive Pairs 6
PCIE_RX6-	C20				
PCIE_TX7+	D22	O PCIE	AC coupled on Module		PCI Express Differential Transmit Pairs 7 (N.C.)
PCIE_TX7-	D23				
PCIE_RX7+	C22	I PCIE	AC coupled off Module		PCI Express Differential Receive Pairs 7 (N.C.)
PCIE_RX7-	C23				
PCIE0_CK_REF+	A88	O PCIE	PCIE		Reference clock output for all PCI Express and PCI Express Graphics lanes.
PCIE0_CK_REF-	A89				

PEG Signals Descriptions

Signal	Pin#	Pin Type	Pwr Rail /Tolerance	PU/PD	Description
PEG_TX0+	D52	O PCIE	AC coupled on Module		PCI Express Graphics transmit differential pairs 0
PEG_TX0-	D53				
PEG_RX0+	C52	I PCIE	AC coupled off Module		PCI Express Graphics receive differential pairs 0
PEG_RX0-	C53				
PEG_TX1+	D55	O PCIE	AC coupled on Module		PCI Express Graphics transmit differential pairs 1
PEG_TX1-	D56				
PEG_RX1+	C55	I PCIE	AC coupled off Module		PCI Express Graphics receive differential pairs 1
PEG_RX1-	C56				
PEG_TX2+	D58	O PCIE	AC coupled on Module		PCI Express Graphics transmit differential pairs 2
PEG_TX2-	D59				
PEG_RX2+	C58	I PCIE	AC coupled off Module		PCI Express Graphics receive differential pairs 2
PEG_RX2-	C59				
PEG_TX3+	D61	O PCIE	AC coupled on Module		PCI Express Graphics transmit differential pairs 3
PEG_TX3-	D62				
PEG_RX3+	C61	I PCIE	AC coupled off Module		PCI Express Graphics receive differential pairs 3
PEG_RX3-	C62				
PEG_TX4+	D65	O PCIE	AC coupled on Module		PCI Express Graphics transmit differential pairs 4
PEG_TX4-	D66				
PEG_RX4+	C65	I PCIE	AC coupled off Module		PCI Express Graphics receive differential pairs 4
PEG_RX4-	C66				
PEG_TX5+	D68	O PCIE	AC coupled on Module		PCI Express Graphics transmit differential pairs 5
PEG_TX5-	D69				
PEG_RX5+	C68	I PCIE	AC coupled off Module		PCI Express Graphics receive differential pairs 5
PEG_RX5-	C69				
PEG_TX6+	D71	O PCIE	AC coupled on Module		PCI Express Graphics transmit differential pairs 6
PEG_TX6-	D72				
PEG_RX6+	C71	I PCIE	AC coupled off Module		PCI Express Graphics receive differential pairs 6
PEG_RX6-	C72				
PEG_TX7+	D74	O PCIE	AC coupled on Module		PCI Express Graphics transmit differential pairs 7
PEG_TX7-	D75				
PEG_RX7+	C74	I PCIE	AC coupled off Module		PCI Express Graphics receive differential pairs 7
PEG_RX7-	C75				
PEG_TX8+	D78	O PCIE	AC coupled on Module		PCI Express Graphics transmit differential pairs 8
PEG_TX8-	D79				
PEG_RX8+	C78	I PCIE	AC coupled off Module		PCI Express Graphics receive differential pairs 8
PEG_RX8-	C79				
PEG_TX9+	D81	O PCIE	AC coupled on Module		PCI Express Graphics transmit differential pairs 9
PEG_TX9-	D82				
PEG_RX9+	C81	I PCIE	AC coupled off Module		PCI Express Graphics receive differential pairs 9
PEG_RX9-	C82				
PEG_TX10+	D85	O PCIE	AC coupled on Module		PCI Express Graphics transmit differential pairs 10
PEG_TX10-	D86				

PEG Signals Descriptions

Signal	Pin#	Pin Type	Pwr Rail /Tolerance	PU/PD	Description
PEG_RX10+	C85	I PCIE	AC coupled off Module		PCI Express Graphics receive differential pairs 10
PEG_RX10-	C86				
PEG_TX11+	D88	O PCIE	AC coupled on Module		PCI Express Graphics transmit differential pairs 11
PEG_TX11-	D89				
PEG_RX11+	C88	I PCIE	AC coupled off Module		PCI Express Graphics receive differential pairs 11
PEG_RX11-	C89				
PEG_TX12+	D91	O PCIE	AC coupled on Module		PCI Express Graphics transmit differential pairs 12
PEG_TX12-	D92				
PEG_RX12+	C91	I PCIE	AC coupled off Module		PCI Express Graphics receive differential pairs 12
PEG_RX12-	C92				
PEG_TX13+	D94	O PCIE	AC coupled on Module		PCI Express Graphics transmit differential pairs 13
PEG_TX13-	D95				
PEG_RX13+	C94	I PCIE	AC coupled off Module		PCI Express Graphics receive differential pairs 13
PEG_RX13-	C95				
PEG_TX14+	D98	O PCIE	AC coupled on Module		PCI Express Graphics transmit differential pairs 14
PEG_TX14-	D99				
PEG_RX14+	C98	I PCIE	AC coupled off Module		PCI Express Graphics receive differential pairs 14
PEG_RX14-	C99				
PEG_TX15+	D101	O PCIE	AC coupled on Module		PCI Express Graphics transmit differential pairs 15
PEG_TX15-	D102				
PEG_RX15+	C101	I PCIE	AC coupled off Module		PCI Express Graphics receive differential pairs 15
PEG_RX15-	C102				
PEG_LANE_RV#	D54	I CMOS	3.3V / 3.3V		PCI Express Graphics lane reversal input strap. Pull low on the Carrier board to reverse lane order.

ExpressCard Signals Descriptions

Signal	Pin#	Pin Type	Pwr Rail /Tolerance	PU/PD	Description
EXCD0_CPPE#	A49	I CMOS	3.3V /3.3V	PU 10k to 3.3V	PCI ExpressCard: PCI Express capable card request, active low, one per card
EXCD1_CPPE#	B48				
EXCD0_PERST#	A48	O CMOS	3.3V /3.3V		PCI ExpressCard: reset, active low, one per card
EXCD1_PERST#	B47				

DDI Signals Descriptions

Signal	Pin#	Pin Type	Pwr Rail /Tolerance	PU/PD	Description
DDI1_PAIR0+/SDVO1_RED+	D26	O PCIE	AC coupled off Module		DDI 1 Pair 0 differential pairs/Serial Digital Video B red output differential pair
DDI1_PAIR0-/SDVO1_RED-	D27				
DDI1_PAIR1+/SDVO1_GRN+	D29	O PCIE	AC coupled off Module		DDI 1 Pair 1 differential pairs/Serial Digital Video B green output differential pair
DDI1_PAIR1-/SDVO1_GRN-	D30				
DDI1_PAIR2+/SDVO1_BLU+	D32	O PCIE	AC coupled off Module		DDI 1 Pair 2 differential pairs/Serial Digital Video B blue output differential pair
DDI1_PAIR2-/SDVO1_BLU-	D33				
DDI1_PAIR3+/SDVO1_CK+	D36	O PCIE	AC coupled off Module		DDI 1 Pair 3 differential pairs/Serial Digital Video B clock output differential pair.
DDI1_PAIR3-/SDVO1_CK-	D37				
DDI1_PAIR4+/SDVO1_INT+	C25	I PCIE	AC coupled off Module		Serial Digital Video B interrupt input differential pair.
DDI1_PAIR4-/SDVO1_INT-	C26				
DDI1_PAIR5+/SDVO1_TVCLKIN+	C29	I PCIE	AC coupled off Module		Serial Digital Video TVOUT synchronization clock input differential pair.
DDI1_PAIR5-/SDVO1_TVCLKIN-	C30				
DDI1_PAIR6+/SDVO1_FLDSTALL+	C15	I PCIE	AC coupled off Module		Serial Digital Video Field Stall input differential pair.
DDI1_PAIR6-/SDVO1_FLDSTALL-	C16				
DDI1_CTRLCLK_AUX+/SDVO1_CTRLCLK	D15	I/O PCIE	AC coupled on Module		DP AUX+ function if DDI1_DDC_AUX_SEL is no connect
		I/O OD CMOS	3.3V / 3.3V		HDMI/DVI I2C CTRLCLK if DDI1_DDC_AUX_SEL is pulled high
DDI1_CTRLCLK_AUX-/SDVO1_CTRLDATA	D16	I/O PCIE	AC coupled on Module		DP AUX- function if DDI1_DDC_AUX_SEL is no connect
		I/O OD CMOS	3.3V / 3.3V		HDMI/DVI I2C CTRLDATA if DDI1_DDC_AUX_SEL is pulled high
DDI1_HPD	C24	I CMOS	3.3V / 3.3V		DDI Hot-Plug Detect
DDI1_DDC_AUX_SEL	D34	I CMOS	3.3V / 3.3V	PD 1M to GND	Selects the function of DDI1_CTRLCLK_AUX+ and DDI1_CTRLDATA_AUX- (N.C.)
DDI2_PAIR0+	D39	O PCIE	AC coupled off Module		DDI 2 Pair 0 differential pairs
DDI2_PAIR0-	D40				
DDI2_PAIR1+	D42	O PCIE	AC coupled off Module		DDI 2 Pair 1 differential pairs
DDI2_PAIR1-	D43				
DDI2_PAIR2+	D46	O PCIE	AC coupled off Module		DDI 2 Pair 2 differential pairs
DDI2_PAIR2-	D47				
DDI2_PAIR3+	D49	O PCIE	AC coupled off Module		DDI 2 Pair 3 differential pairs
DDI2_PAIR3-	D50				
DDI2_CTRLCLK_AUX+	C32	I/O PCIE	AC coupled on Module		DP AUX+ function if DDI2_DDC_AUX_SEL is no connect
		I/O OD CMOS	3.3V / 3.3V		HDMI/DVI I2C CTRLCLK if DDI2_DDC_AUX_SEL is pulled high
DDI2_CTRLCLK_AUX-	C33	I/O PCIE	AC coupled on Module		DP AUX- function if DDI2_DDC_AUX_SEL is no connect
		I/O OD CMOS	3.3V / 3.3V		HDMI/DVI I2C CTRLDATA if DDI2_DDC_AUX_SEL is pulled high
DDI3_HPD	D44	I CMOS	3.3V / 3.3V		DDI Hot-Plug Detect
DDI3_DDC_AUX_SEL	C34	I CMOS	3.3V / 3.3V	PD 1M to GND	Selects the function of DDI2_CTRLCLK_AUX+ and DDI2_CTRLDATA_AUX- (N.C.)
DDI3_PAIR0+	C39	O PCIE	AC coupled off Module		DDI 3 Pair 0 differential pairs
DDI3_PAIR0-	C40				
DDI3_PAIR1+	C42	O PCIE	AC coupled off Module		DDI 3 Pair 1 differential pairs
DDI3_PAIR1-	C43				
DDI3_PAIR2+	C4	O PCIE	AC coupled off Module		DDI 3 Pair 2 differential pairs
DDI3_PAIR2-	C47				
DDI3_PAIR3+	C49	O PCIE	AC coupled off Module		DDI 3 Pair 3 differential pairs
DDI3_PAIR3-	C50				
DDI3_CTRLCLK_AUX+	C36	I/O PCIE	AC coupled on Module		DP AUX+ function if DDI3_DDC_AUX_SEL is no connect
		I/O OD CMOS	3.3V / 3.3V		HDMI/DVI I2C CTRLCLK if DDI3_DDC_AUX_SEL is pulled high
DDI3_CTRLCLK_AUX-	C37	I/O PCIE	AC coupled on Module		DP AUX- function if DDI3_DDC_AUX_SEL is no connect
		I/O OD CMOS	3.3V / 3.3V		HDMI/DVI I2C CTRLDATA if DDI3_DDC_AUX_SEL is pulled high
DDI3_HPD	C44	I CMOS	3.3V / 3.3V		DDI Hot-Plug Detect
DDI3_DDC_AUX_SEL	C38	I CMOS	3.3V / 3.3V	PD 1M to GND	Selects the function of DDI3_CTRLCLK_AUX+ and DDI3_CTRLDATA_AUX- (N.C.)

USB Signals Descriptions

Signal	Pin#	Pin Type	Pwr Rail /Tolerance	PU/PD	Description
USB0+	A46	I/O USB	3.3V Suspend/3.3V		USB differential pairs 0
USB0-	A45				
USB1+	B46	I/O USB	3.3V Suspend/3.3V		USB differential pairs 1
USB1-	B45				
USB2+	A43	I/O USB	3.3V Suspend/3.3V		USB differential pairs 2
USB2-	A42				
USB3+	B43	I/O USB	3.3V Suspend/3.3V		USB differential pairs 3
USB3-	B42				
USB4+	A40	I/O USB	3.3V Suspend/3.3V		USB differential pairs 4
USB4-	A39				
USB5+	B40	I/O USB	3.3V Suspend/3.3V		USB differential pairs 5
USB5-	B39				
USB6+	A37	I/O USB	3.3V Suspend/3.3V		USB differential pairs 6
USB6-	A36				
USB7+	B37	I/O USB	3.3V Suspend/3.3V		USB differential pairs 7, USB7 may be configured as a USB client or as a host, or both, at the Module designer's discretion.
USB7-	B36				
USB_0_1_OC#	B44	I CMOS	3.3V Suspend/3.3V	PU 10k to 3.3VSB	USB over-current sense, USB channels 0 and 1. A pull-up for this line shall be present on the Module. An open drain driver from a USB current monitor on the Carrier Board may drive this line low. Do not pull this line high on the Carrier Board.
USB_2_3_OC#	A44	I CMOS	3.3V Suspend/3.3V	PU 10k to 3.3VSB	USB over-current sense, USB channels 2 and 3. A pull-up for this line shall be present on the Module. An open drain driver from a USB current monitor on the Carrier Board may drive this line low. Do not pull this line high on the Carrier Board.
USB_4_5_OC#	B38	I CMOS	3.3V Suspend/3.3V	PU 10k to 3.3VSB	USB over-current sense, USB channels 4 and 5. A pull-up for this line shall be present on the Module. An open drain driver from a USB current monitor on the Carrier Board may drive this line low. Do not pull this line high on the Carrier Board.
USB_6_7_OC#	A38	I CMOS	3.3V Suspend/3.3V	PU 10k to 3.3VSB	USB over-current sense, USB channels 6 and 7. A pull-up for this line shall be present on the Module. An open drain driver from a USB current monitor on the Carrier Board may drive this line low. Do not pull this line high on the Carrier Board.
USB_SSTX0+	D4	O PCIE	AC coupled on Module		Additional transmit signal differential pairs for the SuperSpeed USB data path.
USB_SSTX0-	D3				
USB_SSRX0+	C4	I PCIE	AC coupled off Modul		Additional receive signal differential pairs for the SuperSpeed USB data path.
USB_SSRX0-	C3				
USB_SSTX1+	D7	O PCIE	AC coupled on Module		Additional transmit signal differential pairs for the SuperSpeed USB data path.
USB_SSTX1-	D6				
USB_SSRX1+	C7	I PCIE	AC coupled off Modul		Additional receive signal differential pairs for the SuperSpeed USB data path.
USB_SSRX1-	C6				
USB_SSTX2+	D10	O PCIE	AC coupled on Module		Additional transmit signal differential pairs for the SuperSpeed USB data path.
USB_SSTX2-	D9				

USB Signals Descriptions

Signal	Pin#	Pin Type	Pwr Rail /Tolerance	PU/PD	Description
USB_SSRX2+	C10	I PCIE	AC coupled off Modul		Additional receive signal differential pairs for the SuperSpeed USB data path.
USB_SSRX2-	C9				
USB_SSTX3+	D13	O PCIE	AC coupled on Module		Additional transmit signal differential pairs for the SuperSpeed USB data path.
USB_SSTX3-	D12				
USB_SSRX3+	C13	I PCIE	AC coupled off Modul		Additional receive signal differential pairs for the SuperSpeed USB data path.
USB_SSRX3-	C12				

LVDS Signals Descriptions

Signal	Pin#	Pin Type	Pwr Rail /Tolerance	PU/PD	Description
LVDS_A0+	A71	O LVDS	LVDS		LVDS Channel A differential pairs
LVDS_A0-	A72				
LVDS_A1+	A73	O LVDS	LVDS		
LVDS_A1-	A74				
LVDS_A2+	A75	O LVDS	LVDS		
LVDS_A2-	A76				
LVDS_A3+	A78	O LVDS	LVDS		
LVDS_A3-	A79				
LVDS_A_CK+	A81	O LVDS	LVDS		LVDS Channel A differential clock
LVDS_A_CK-	A82				
LVDS_B0+	B71	O LVDS	LVDS		LVDS Channel B differential pairs
LVDS_B0-	B72				
LVDS_B1+	B73	O LVDS	LVDS		
LVDS_B1-	B74				
LVDS_B2+	B75	O LVDS	LVDS		
LVDS_B2-	B76				
LVDS_B3+	B77	O LVDS	LVDS		
LVDS_B3-	B78				
LVDS_B_CK+	B81	O LVDS	LVDS		LVDS Channel B differential clock
LVDS_B_CK-	B82				
LVDS_VDD_EN	A77	O CMOS	3.3V / 3.3V		LVDS panel power enable
LVDS_BKLT_EN	B79	O CMOS	3.3V / 3.3V		LVDS panel backlight enable
LVDS_BKLT_CTRL	B83	O CMOS	3.3V / 3.3V		LVDS panel backlight brightness control
LVDS_I2C_CK	A83	I/O OD	3.3V / 3.3V		I2C clock output for LVDS display use (N.C.)
LVDS_I2C_DAT	A84	I/O OD	3.3V / 3.3V		I2C data line for LVDS display use (N.C.)

LPC Signals Descriptions

Signal	Pin#	Pin Type	Pwr Rail /Tolerance	PU/PD	Description
LPC_AD0	B4	I/O CMOS	3.3V / 3.3V		LPC multiplexed address, command and data bus
LPC_AD1	B5				
LPC_AD2	B6				
LPC_AD3	B7				
LPC_FRAME#	B3	O CMOS	3.3V / 3.3V		LPC frame indicates the start of an LPC cycle
LPC_DRQ0#	B8	I CMOS	3.3V / 3.3V		LPC serial DMA request
LPC_DRQ1#	B9				
LPC_SERIRQ	A50	I/O CMOS	3.3V / 3.3V	PU 10K to 3.3V	LPC serial interrupt
LPC_CLK	B10	O CMOS	3.3V / 3.3V		LPC clock output - 33MHz nominal

SPI Signals Descriptions

Signal	Pin#	Pin Type	Pwr Rail /Tolerance	PU/PD	Description
SPI_CS#	B97	O CMOS	3.3V Suspend/3.3V		Chip select for Carrier Board SPI - may be sourced from chipset SPI0 or SPI1
SPI_MISO	A92	I CMOS	3.3V Suspend/3.3V		Data in to Module from Carrier SPI
SPI_MOSI	A95	O CMOS	3.3V Suspend/3.3V		Data out from Module to Carrier SPI
SPI_CLK	A94	O CMOS	3.3V Suspend/3.3V		Clock from Module to Carrier SPI
SPI_POWER	A91	O	3.3V Suspend/3.3V		Power supply for Carrier Board SPI – sourced from Module – nominally 3.3V. The Module shall provide a minimum of 100mA on SPI_POWER. Carriers shall use less than 100mA of SPI_POWER. SPI_POWER shall only be used to power SPI devices on the Carrier
BIOS_DIS0#	A34	I CMOS	NA		Selection straps to determine the BIOS boot device. The Carrier should only float these or pull them low, please refer to COM Express Module Base Specification Revision 2.1 for strapping options of BIOS disable signals.
BIOS_DIS1#	B88				

VGA Signals Descriptions

Signal	Pin#	Pin Type	Pwr Rail /Tolerance	PU/PD	Description
VGA_RED	B89	O Analog	Analog	PD 150Rx2	Red for monitor. Analog output
VGA_GRN	B91	O Analog	Analog	PD 150Rx2	Green for monitor. Analog output
VGA_BLU	B92	O Analog	Analog	PD 150Rx2	Blue for monitor. Analog output
VGA_HSYNC	B93	O CMOS	3.3V / 3.3V		Horizontal sync output to VGA monitor
VGA_VSYNC	B94	O CMOS	3.3V / 3.3V		Vertical sync output to VGA monitor
VGA_I2C_CK	B95	I/O OD	3.3V / 3.3V	PD 2.2K to 3.3V	DDC clock line (I2C port dedicated to identify VGA monitor capabilities)
VGA_I2C_DAT	B96	I/O OD	3.3V / 3.3V	PD 2.2K to 3.3V	DDC data line.

Serial Interface Signals Descriptions

Signal	Pin#	Pin Type	Pwr Rail /Tolerance	PU/PD	Description
SER0_TX	A98	O CMOS	5V / 12V		General purpose serial port 0 transmitter
SER0_RX	A99	I CMOS	5V / 12V		General purpose serial port 0 receiver
SER1_TX	A101	O CMOS	5V / 12V		General purpose serial port 1 transmitter
SER1_RX	A102	I CMOS	5V / 12V		General purpose serial port 1 receiver

Miscellaneous Signal Descriptions

Signal	Pin#	Pin Type	Pwr Rail /Tolerance	PU/PD	Description
I2C_CK	B33	I/O OD	3.3V Suspend/3.3V	PU 2.2K to 3.3VSB	General purpose I2C port clock output
I2C_DAT	B34	I/O OD	3.3V Suspend/3.3V	PU 2.2K to 3.3VSB	General purpose I2C port data I/O line
SPKR	B32	O CMOS	3.3V / 3.3V		Output for audio enunciator - the "speaker" in PC-AT systems. This port provides the PC beep signal and is mostly intended for debugging purposes.
WDT	B27	O CMOS	3.3V / 3.3V		Output indicating that a watchdog time-out event has occurred.
FAN_PWNOUT	B101	O OD CMOS	3.3V / 12V		Fan speed control. Uses the Pulse Width Modulation (PWM) technique to control the fan's RPM.
FAN_TACHIN	B102	I OD CMOS	3.3V / 12V	PU 10K to 3.3V	Fan tachometer input for a fan with a two pulse output.
TPM_PP	A96	I CMOS	3.3V / 3.3V		Trusted Platform Module (TPM) Physical Presence pin. Active high.

Power and System Management Signals Descriptions

Signal	Pin#	Pin Type	Pwr Rail /Tolerance	PU/PD	Description
PWRBTN#	B12	I CMOS	3.3V Suspend/3.3V	PU 10K to 3.3VSB	A falling edge creates a power button event. Power button events can be used to bring a system out of S5 soft off and other suspend states, as well as powering the system down.
SYS_RESET#	B49	I CMOS	3.3V Suspend/3.3V	PU 10K to 3.3VSB	Reset button input. Active low request for Module to reset and reboot. May be falling edge sensitive. For situations when SYS_RESET# is not able to reestablish control of the system, PWR_OK or a power cycle may be used.
CB_RESET#	B50	O CMOS	3.3V Suspend/3.3V		Reset output from Module to Carrier Board. Active low. Issued by Module chipset and may result from a low SYS_RESET# input, a low PWR_OK input, a VCC_12V power input that falls below the minimum specification, a watchdog timeout, or may be initiated by the Module software.
PWR_OK	B24	I CMOS	3.3V / 3.3V		Power OK from main power supply. A high value indicates that the power is good. This signal can be used to hold off Module startup to allow Carrier based FPGAs or other configurable devices time to be programmed.
SUS_STAT#	B18	O CMOS	3.3V Suspend/3.3V		Indicates imminent suspend operation; used to notify LPC devices.
SUS_S3#	A15	O CMOS	3.3V Suspend/3.3V		Indicates system is in Suspend to RAM state. Active low output. An inverted copy of SUS_S3# on the Carrier Board may be used to enable the non-standby power on a typical ATX supply.
SUS_S4#	A18	O CMOS	3.3V Suspend/3.3V		Indicates system is in Suspend to Disk state. Active low output.
SUS_S5#	A24	O CMOS	3.3V Suspend/3.3V		Indicates system is in Soft Off state.
WAKEO#	B66	I CMOS	3.3V Suspend/3.3V	PU 10K to 3.3VSB	PCI Express wake up signal.
WAKE1#	B67	I CMOS	3.3V Suspend/3.3V	PU 10K to 3.3VSB	General purpose wake up signal. May be used to implement wake-up on PS2 keyboard or mouse activity.
BATLOW#	A27	I CMOS	3.3V Suspend/ 3.3V	PU 10K to 3.3VSB	Indicates that external battery is low.
LID#	A103	I OD CMOS	3.3V Suspend/12V	PU 10K to 3.3VSB	LID switch. Low active signal used by the ACPI operating system for a LID switch.
SLEEP#	B103	I OD CMOS	3.3V Suspend/12V	PU 10K to 3.3VSB	Sleep button. Low active signal used by the ACPI operating system to bring the system to sleep state or to wake it up again.
THRM#	B35	I CMOS	3.3V / 3.3V	PU 8.2K to 3.3V	Input from off-Module temp sensor indicating an over-temp situation.
THRMTRIP#	A35	O CMOS	3.3V / 3.3V	PU 10K to 3.3V	Active low output indicating that the CPU has entered thermal shutdown.
SMB_CK	B13	I/O OD	3.3V Suspend/3.3V	PU 2.2K to 3.3VSB	System Management Bus bidirectional clock line.
SMB_DAT	B14	I/O OD	3.3V Suspend/3.3V	PU 2.2K to 3.3VSB	System Management Bus bidirectional data line.
SMB_ALERT#	B15	I CMOS	3.3V Suspend/3.3V	PU 10K to 3.3VSB	System Management Bus Alert – active low input can be used to generate an SMI# (System Management Interrupt) or to wake the system.

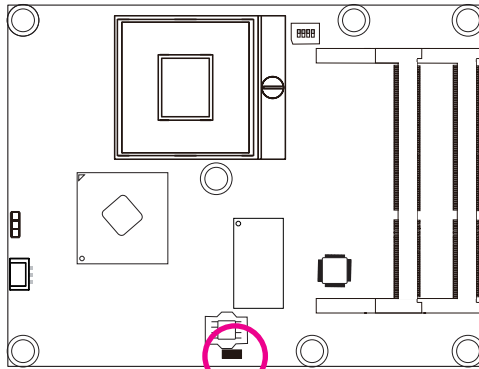
GPIO Signals Descriptions

Signal	Pin#	Pin Type	Pwr Rail /Tolerance	PU/PD	Description
GPO0	A93	O CMOS	3.3V / 3.3V		General purpose output pins.
GPO1	B54				
GPO2	B57				
GPO3	B63				
GPI0	A54	I CMOS	3.3V / 3.3V		General purpose input pins.
GPI1	A63				
GPI2	A67				
GPI3	A85				

Power and GND Signal Descriptions

Signal	Pin#	Pin Type	Pwr Rail /Tolerance	PU/PD	Description
VCC_12V	A104~A109 B104~B109 C104~C109 D104~D109	Power			Primary power input: +12V nominal. All available VCC_12V pins on the connector(s) shall be used.
VCC_5V_SBY	B84~B87	Power			Standby power input: +5.0V nominal. If VCC5_SBY is used, all available VCC_5V_SBY pins on the connector(s) shall be used. Only used for standby and suspend functions. May be left unconnected if these functions are not used in the system design.
VCC_RTC	A47	Power			Real-time clock circuit-power input. Nominally +3.0V.
GND	A1, A11, A21, A31, A41, A51, A57, A60, A66, A70, A80, A90, A100, A110, B1, B11, B21 ,B31, B41, B51, B60, B70, B80, B90, B100, B110, C1, C2, C5, C8, C11, C14, C21, C31, C41, C51, C60, C70, C73, C76, C80, C84, C87, C90, C93, C96, C100, C103, C110, D1, D2, D5, D8, D11, D14, D21, D31, D51, D60,	Power			Ground - DC power and signal and AC signal return path. All available GND connector pins shall be used and tied to Carrier Board GND plane.

Standby Power LED



Standby Power LED

This LED will light when the system is in the standby mode.

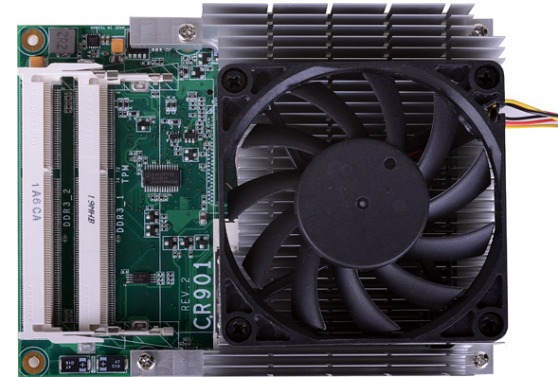
Cooling Option

Heat Sink with Cooling Fan

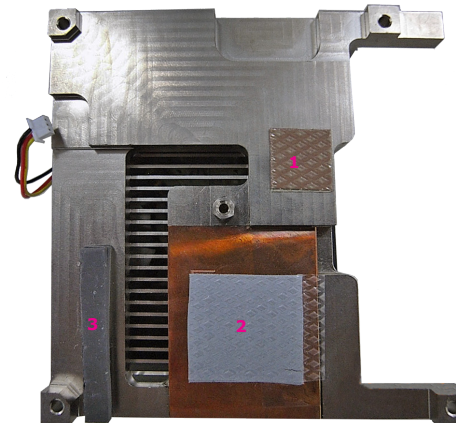


Note:

The system board used in the following illustrations may not resemble the actual board. These illustrations are for reference only.



Top View of the Heat Sink



Bottom View of the Heat Sink

- "1" "2" and "3" denote the locations of the thermal pads designed to contact the corresponding components that are on CM901-B.



Important:

Remove the plastic covering from the thermal pads prior to mounting the heat sink onto CM901-B.

Installing CM901-B onto a Carrier Board



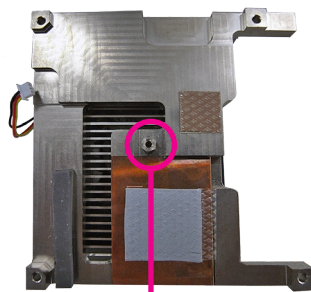
Important:

The carrier board (COM331-B) used in this section is for reference purpose only and may not resemble your carrier board. These illustrations are mainly to guide you on how to install CM901-B onto the carrier board of your choice.

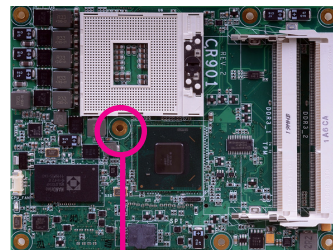
• To download COM331-B datasheet and manual

1. Use the provided screw to install the heatsink onto the module. First align the mounting hole of the heatsink with the mounting hole of the module and then from the bottom side of the module, secure them with the provided screw. The module and heatsink assembly should look like the one shown below.

bottom side of heat sink



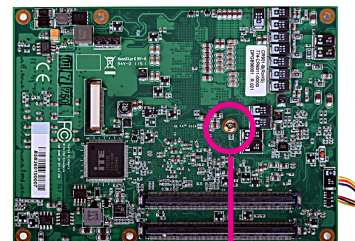
Mounting hole



Mounting hole



Top view

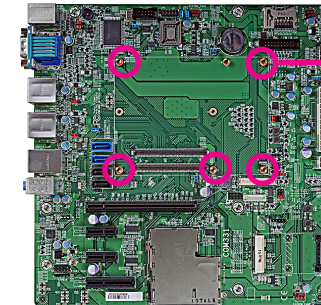


Bottom view



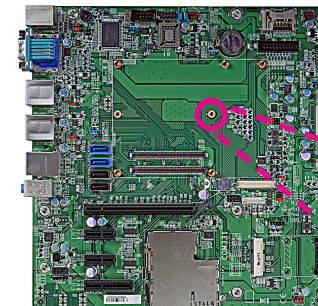
Mounting screw

2. Now install the module and heatsink assembly onto the carrier board. The photo below shows the locations of the mounting holes on carrier board.

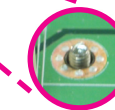


Mounting hole

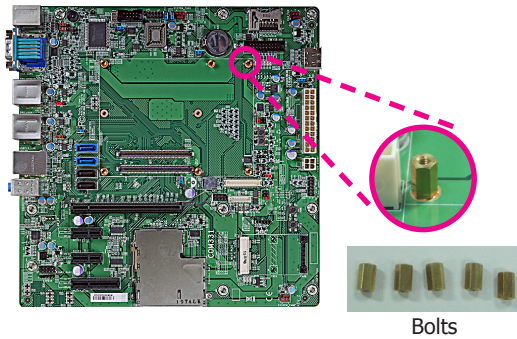
3. Insert the provided mounting screws into the mounting holes - from the bottom through the top of the carrier board.



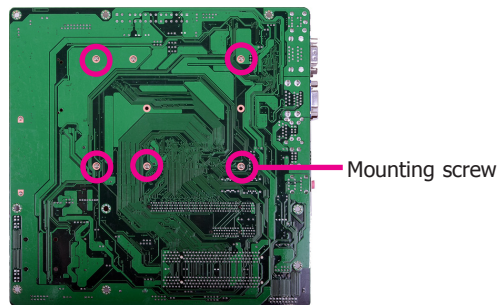
Mounting screws



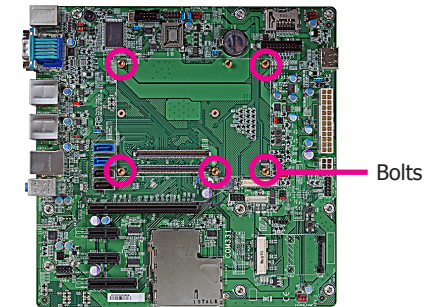
4. While supporting the mounting screw at the bottom, from the top side of the board, fasten a bolt into the screw.



5. The photo below shows the solder side of the board with the screws already fixed in place.



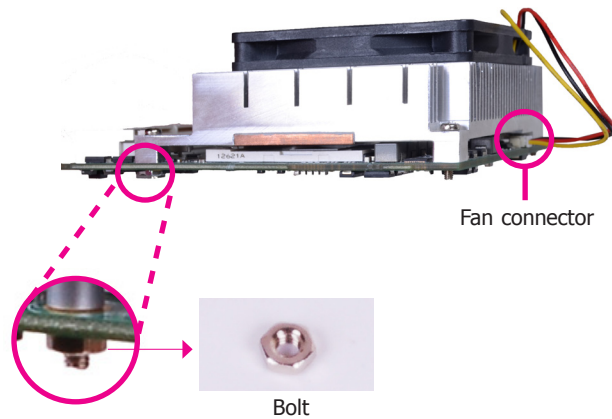
6. The photo below shows the component side of the board with the bolts already fixed in place.



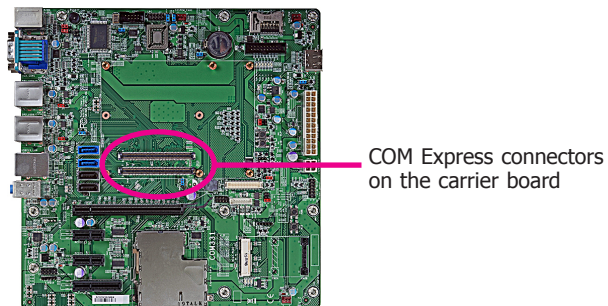
7. Position the heat sink on top of CM901-B with the heat sink's mounting holes aligned with CM901-B's mounting holes. Insert one of the provided long screws into the mounting hole shown in the photo below.



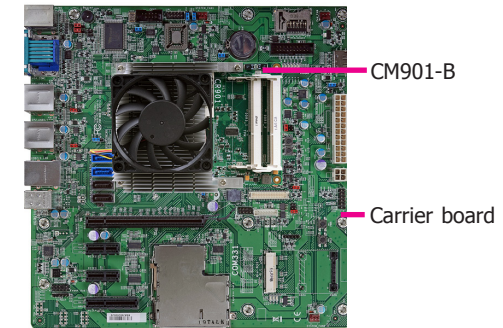
8. From the bottom of the board, fasten the provided bolt into the screw and then connect the cooling fan's cable to the fan connector on CM901-B.



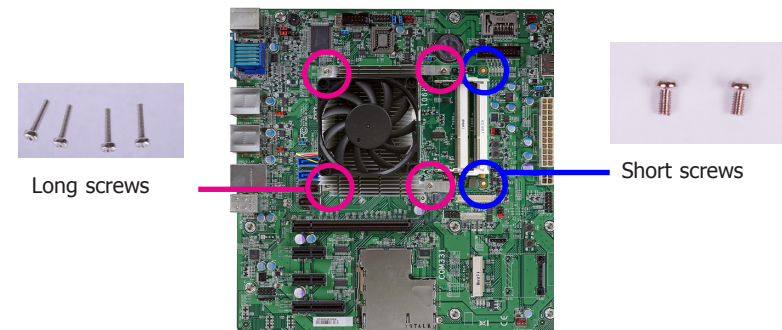
9. Grasping CM901-B by its edges, position it on top of the carrier board with its mounting holes aligned with the bolts on the carrier board. This will also align the COM Express connectors of the two boards to each other.



10. Press CM901-B down firmly until it is completely seated on the COM Express connectors of the carrier board.



11. Use the provided mounting screws to secure CM901-B with heat sink to the carrier board. The photo below shows the locations of the long/short mounting screws.



Chapter 4 - BIOS Setup

Overview

The BIOS is a program that takes care of the basic level of communication between the CPU and peripherals. It contains codes for various advanced features found in this system board. The BIOS allows you to configure the system and save the configuration in a battery-backed CMOS so that the data retains even when the power is off. In general, the information stored in the CMOS RAM of the EEPROM will stay unchanged unless a configuration change has been made such as a hard drive replaced or a device added. It is possible that the CMOS battery will fail causing CMOS data loss. If this happens, you need to install a new CMOS battery and reconfigure the BIOS settings.


Note:

The BIOS is constantly updated to improve the performance of the system board; therefore the BIOS screens in this chapter may not appear the same as the actual one. These screens are for reference purpose only.

Default Configuration

Most of the configuration settings are either predefined according to the Load Optimal Defaults settings which are stored in the BIOS or are automatically detected and configured without requiring any actions. There are a few settings that you may need to change depending on your system configuration.

Entering the BIOS Setup Utility

The BIOS Setup Utility can only be operated from the keyboard and all commands are keyboard commands. The commands are available at the right side of each setup screen.

The BIOS Setup Utility does not require an operating system to run. After you power up the system, the BIOS message appears on the screen and the memory count begins. After the memory test, the message "Press DEL to run setup" will appear on the screen. If the message disappears before you respond, restart the system or press the "Reset" button. You may also restart the system by pressing the <Ctrl> <Alt> and keys simultaneously.

Legends

KEYs	Function
Right and Left Arrows	Moves the highlight left or right to select a menu.
Up and Down Arrows	Moves the highlight up or down between submenus or fields.
<Esc>	Exits to the BIOS setup utility
+ (plus key)	Scrolls forward through the values or options of the highlighted field.
- (minus key)	Scrolls backward through the values or options of the highlighted field.
Tab	Select a field
<F1>	Displays general help
<F4>	Saves and exits the setup program
<Enter>	Press <Enter> to enter the highlighted submenu

Scroll Bar

When a scroll bar appears to the right of the setup screen, it indicates that there are more available fields not shown on the screen. Use the up and down arrow keys to scroll through all the available fields.

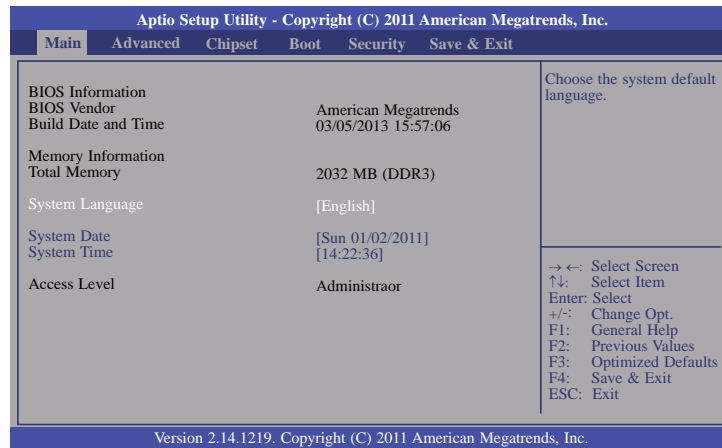
Submenu

When "►" appears on the left of a particular field, it indicates that a submenu which contains additional options are available for that field. To display the submenu, move the highlight to that field and press <Enter>.

AMI BIOS Setup Utility

Main

The Main menu is the first screen that you will see when you enter the BIOS Setup Utility.



System Date

The date format is <day>, <month>, <date>, <year>. Day displays a day, from Sunday to Saturday. Month displays the month, from January to December. Date displays the date, from 1 to 31. Year displays the year, from 1980 to 2099.

System Time

The time format is <hour>, <minute>, <second>. The time is based on the 24-hour military-time clock. For example, 1 p.m. is 13:00:00. Hour displays hours from 00 to 23. Minute displays minutes from 00 to 59. Second displays seconds from 00 to 59.

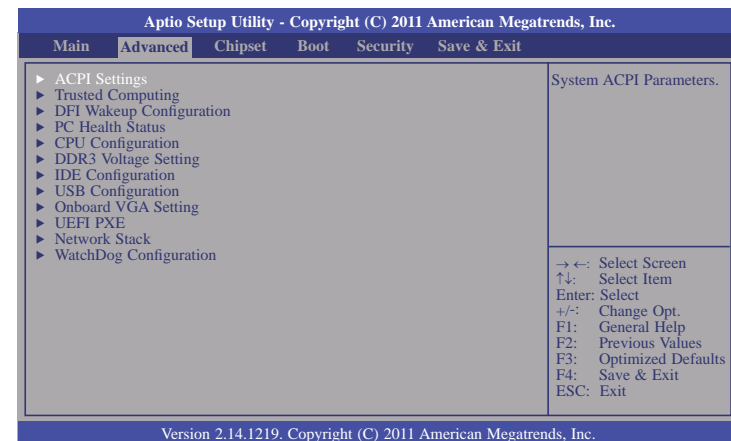
Advanced

The Advanced menu allows you to configure your system for basic operation. Some entries are defaults required by the system board, while others, if enabled, will improve the performance of your system or let you set some features according to your preference.



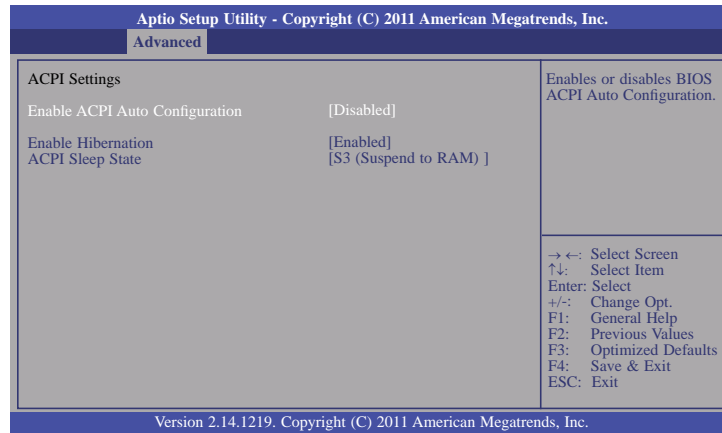
Important:

Setting incorrect field values may cause the system to malfunction.



ACPI Settings

This section is used to configure the ACPI settings.



Enable Hibernation

Enables or Disables system ability to Hibernation (OS/S4 Sleep State). This option may be not effective with some OS.

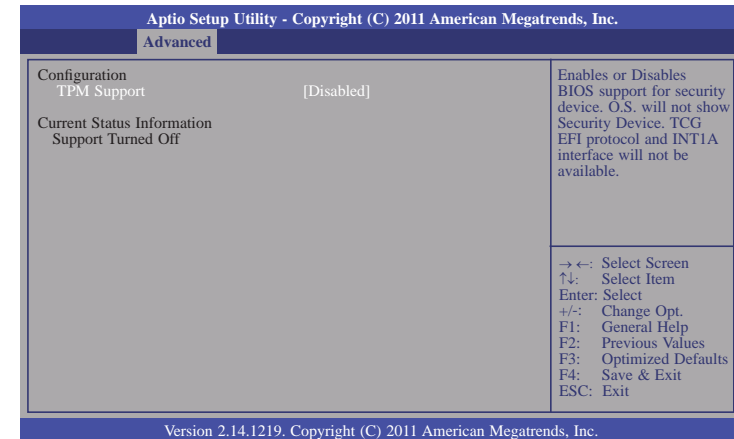
ACPI Sleep State

Selects the highest ACPI sleep state, the system will enter when the Suspend button is pressed.

S3(STR) Enables the Suspend to RAM function.

Trusted Computing

This section configures settings relevant to Trusted Computing innovations.

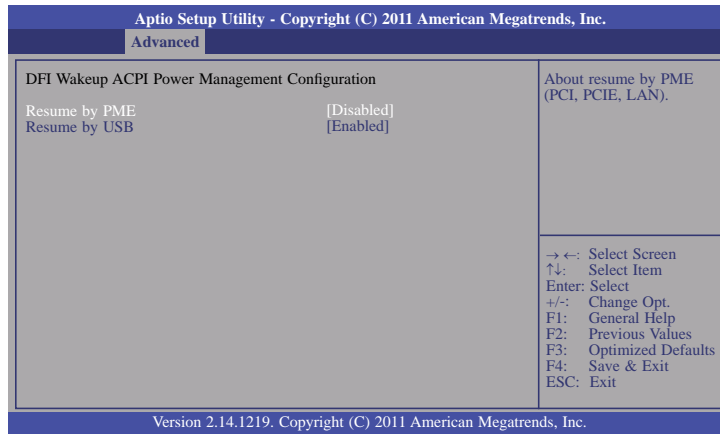


TPM Support

Enables or Disables TPM. O.S. will not show TPM. Resetting the platform is required.

DFI Wakeup Configuration

This section is used to configure the ACPI Power Management.



Resume by PME

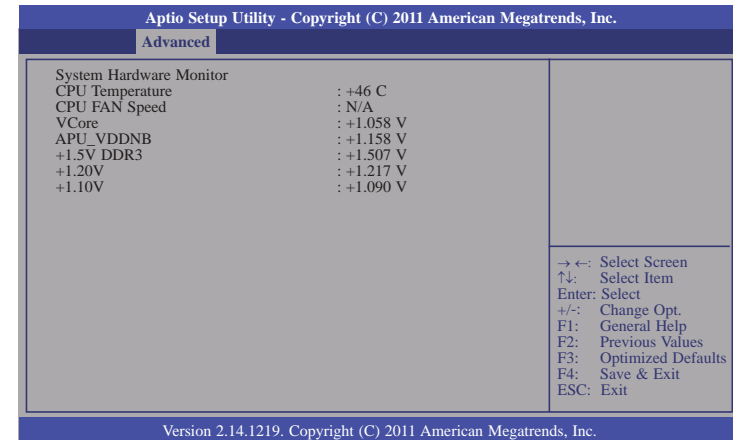
Enable this field to use the PME signal to wake up the system (via PCIE, PCIE and LAN).

Resume by USB

When Enabled, the system uses the USB to generate a wakeup event.

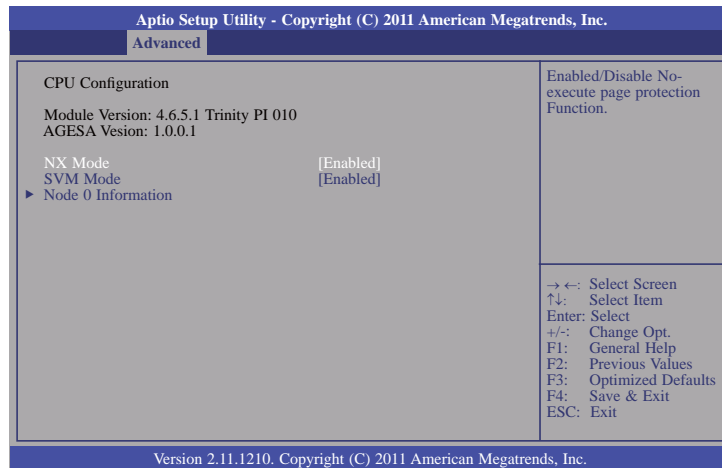
PC Health Status

This section displays hardware health monitor.



CPU Configuration

This section is used to configure the CPU. It will also display the detected CPU information.



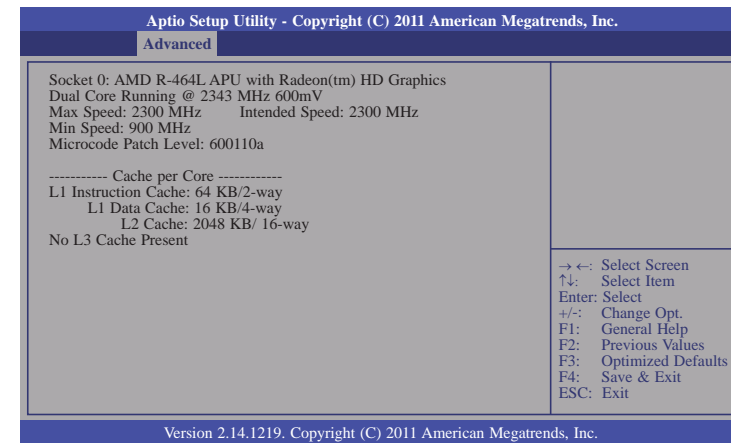
NX Mode

Enable/disable No-execute page protection function.

SVM Mode

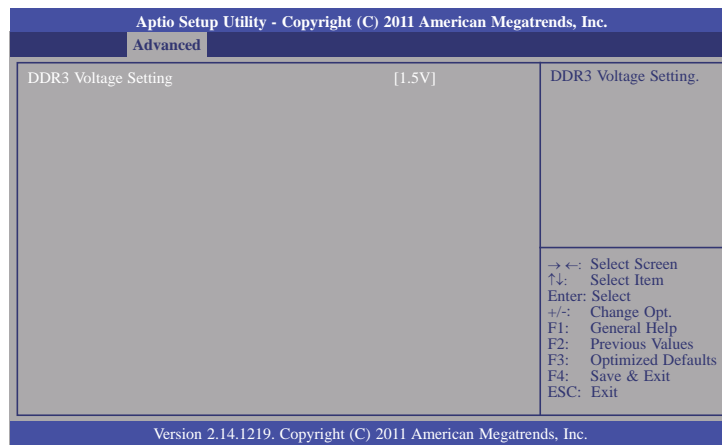
Enable/disable CPU virtualization.

Node 0 Information



DDR3 Voltage Setting

This section is used to configure the DDR3 Voltage Setting.

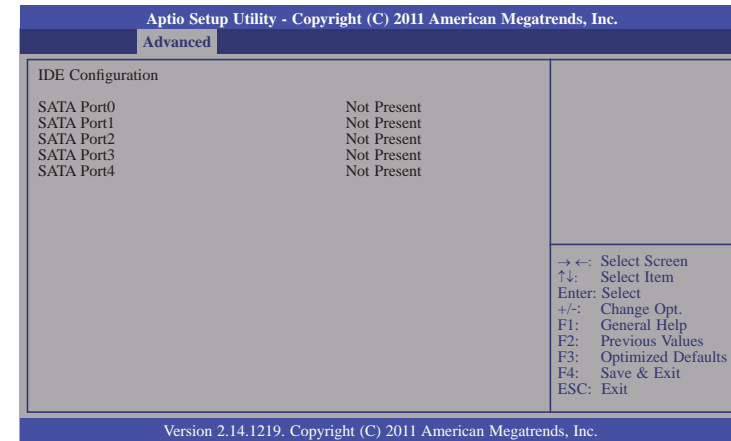


DDR3 Voltage Setting

Selects the DDR3 Voltage Setting. The options are 1.5V, 1.35V and 1.25V.

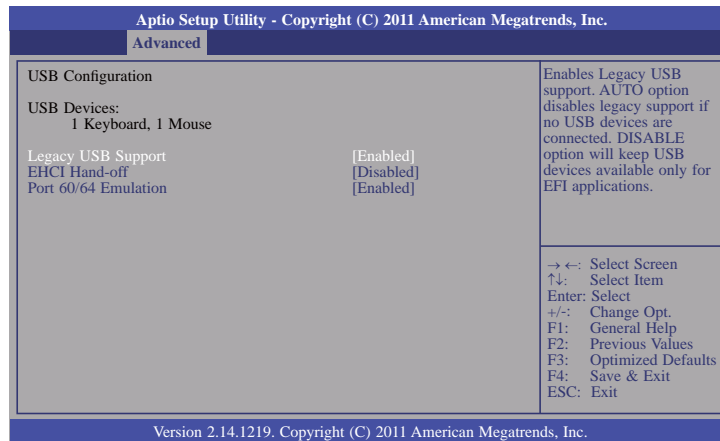
IDE Configuration

This section is used to configure IDE functions.



USB Configuration

This section is used to configure USB.



Legacy USB Support

Enabled

Enables legacy USB.

Auto

Disables support for legacy when no USB devices are connected.

Disabled

Keeps USB devices available only for EFI applications.

EHCI Hand-off

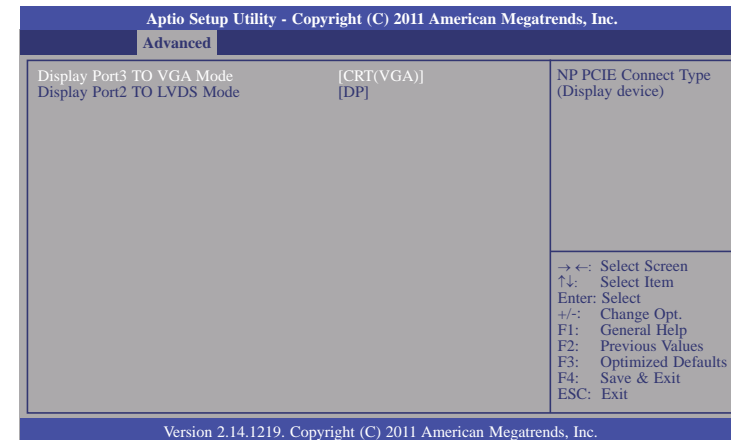
This is a workaround for OSES that does not support EHCI hand-off. The EHCI ownership change should be claimed by the EHCI driver.

Port 60/64 Emulation

Enables I/O port 60h/64h emulation support. This should be able for the complete USB keyboard legacy support for non-USB aware OSES.

Onboard VGA Setting

This section displays the onboard VGA setting.



Display Port3 TO VGA Mode

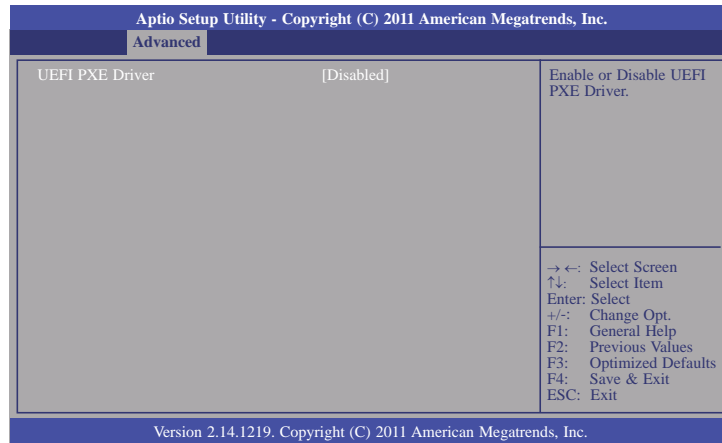
This field is used to select the mode of the onboard display port3. The options are CRT(VGA), Display Port or Disabled Mode.

Display Port2 TO LVDS Mode

This field is used to select the mode of the onboard display port2. The options are LVDS or Display Port Mode.

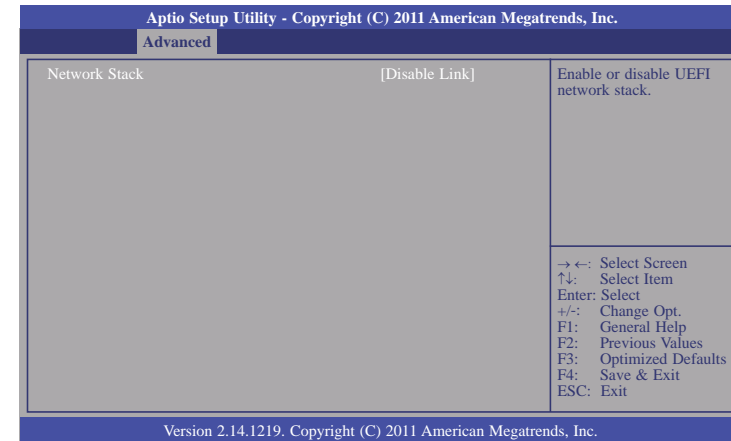
UEFI PXE

This section displays the UEFI PXE.



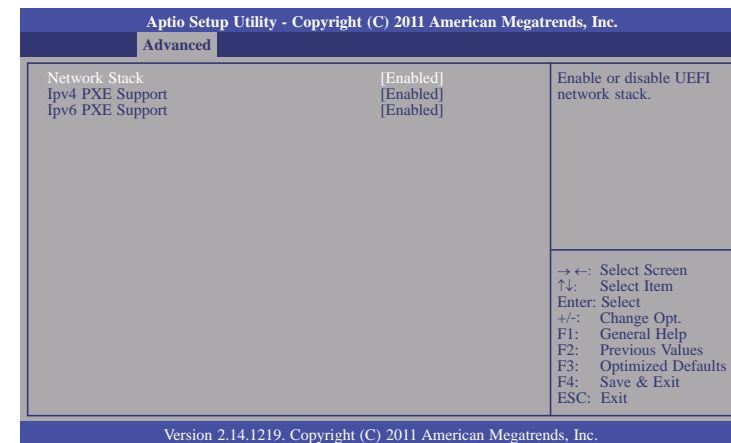
Network Stack

This section configures settings relevant to the network stack.



Network Stack

Enable or disable UEFI network stack.

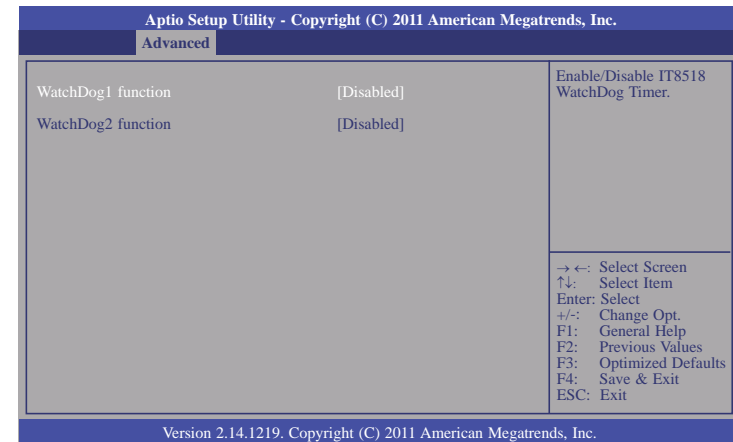


Ipv4 PXE Support

When enabled, Ipv4 PXE boot supports. When disabled, Ipv4 PXE boot option will not be created.

Ipv6 PXE Support

When enabled, Ipv6 PXE boot supports. When disabled, Ipv6 PXE boot option will not be created.

WatchDog Configuration**WatchDog function**

This field is used to enable or disable the Watchdog timer function.

Watchdog 1 function

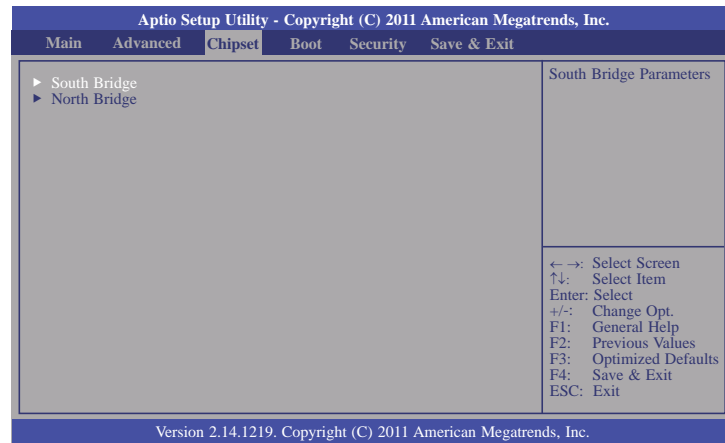
For CM901-B module board (Reset CM901-B by hardware)

Watchdog 2 function

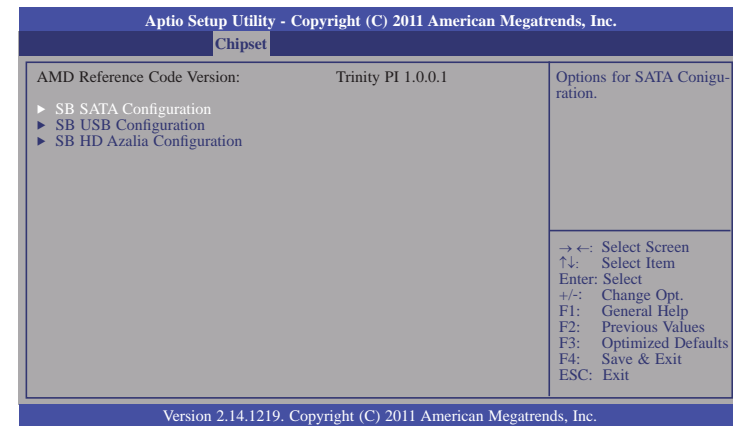
For carrier board usage.

Chipset

This section configures relevant chipset functions.



South Bridge



SB SATA Configuration

Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.

Chipset

OnChip SATA Channel	[Enabled]
OnChip SATA Type	[Native IDE]

→ ←: Select Screen
 ↑↓: Select Item
 Enter: Select
 +/-: Change Opt.
 F1: General Help
 F2: Previous Values
 F3: Optimized Defaults
 F4: Save & Exit
 ESC: Exit

Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.

OnChip SATA Channel

This field is used to enable or disable the SATA function.

OnChip SATA Type

This field is used to configure the SATA drives in Native IDE, RAID or AHCI mode.

SB USB Configuration

Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.

Chipset

XHCI Controller 0	[Enabled]
XHCI Controller 1	[Enabled]
OHCI HC(Bus 0 Dev 18 Fn 0)	[Enabled]
EHCI HC(Bus 0 Dev 18 Fn 2)	[Enabled]
OHCI HC(Bus 0 Dev 19 Fn 0)	[Enabled]
EHCI HC(Bus 0 Dev 19 Fn 2)	[Enabled]
OHCI HC(Bus 0 Dev 20 Fn 5)	[Enabled]
USB Port 0	[Enabled]
USB Port 1	[Enabled]
USB Port 2	[Enabled]
USB Port 3	[Enabled]
USB Port 4	[Enabled]
USB Port 5	[Enabled]
USB Port 6	[Enabled]
USB Port 7	[Enabled]
USB Port 8	[Enabled]
USB Port 9	[Enabled]
XHCI0 Port0	[Enabled]
XHCI0 Port1	[Enabled]
XHCI1 Port0	[Enabled]
XHCI1 Port1	[Enabled]
USB Port FL0	[Enabled]
USB Port FL1	[Enabled]

XHCI ENABLE help.

→ ←: Select Screen
 ↑↓: Select Item
 Enter: Select
 +/-: Change Opt.
 F1: General Help
 F2: Previous Values
 F3: Optimized Defaults
 F4: Save & Exit
 ESC: Exit

nds, Inc.

SB HD Azalia Configuration

Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.

Chipset

HD Audio Azalia Device	[Enabled]
------------------------	-----------

→ ←: Select Screen
 ↑↓: Select Item
 Enter: Select
 +/-: Change Opt.
 F1: General Help
 F2: Previous Values
 F3: Optimized Defaults
 F4: Save & Exit
 ESC: Exit

Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.

North Bridge Configuration

Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.	
Chipset	
North Bridge Configuration ▶ GFX Configuration Memory Information Total Memory: 2032 MB (DDR3) ▶ Memory Configuration ▶ Socket 0 Information	GFX Configuration. → ←: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.	

GFX Configuration

Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.	
Chipset	
GFX Configuration Primary Video Device [NB PCIe slot Video] Integrated Graphics [Auto]	Select Primary Video Device that BIOS will use to for output. → ←: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.	

Integrated Graphics

Enable Intergrated Graphics controller.

Memory Configuration

Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.	
Chipset	
Memory Configuration	Memory Hole Remapping
Memory Hole Remapping [Enabled]	
→ ←: Select Screen ↑ ↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit	
Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.	

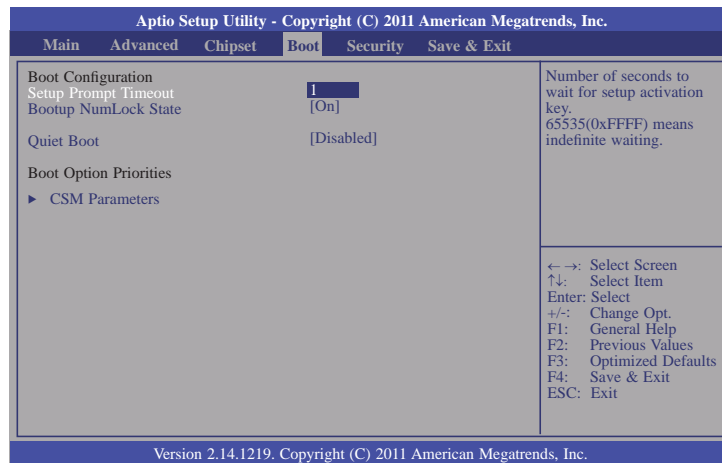
Memory Hole Remapping

Enable or disable memory hole remapping.

Socket 0 Information

Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.	
Chipset	
Socket 0 Information	
Starting Address: 0 KB Ending Address: 2097151 KB	
DIMM0: Not Present DIMM1: size=2048 MB, speed=533 MHz	
→ ←: Select Screen ↑ ↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit	
Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.	

Boot



Setup Prompt Timeout

Selects the number of seconds to wait for the setup activation key. 65535(0xFFFF) denotes indefinite waiting.

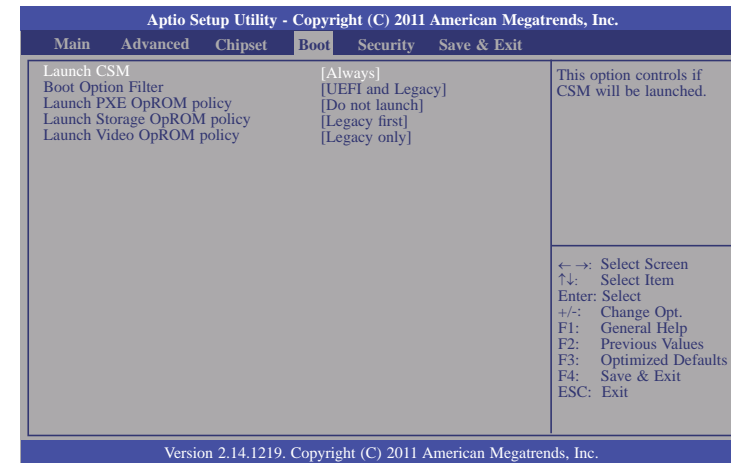
Bootup NumLock State

This allows you to determine the default state of the numeric keypad. By default, the system boots up with NumLock on wherein the function of the numeric keypad is the number keys. When set to Off, the function of the numeric keypad is the arrow keys.

Quiet Boot

Enables or disables the quiet boot function.

CSM Parameters



Boot Option Filter

This option controls what devices system can boot to.

Launch PXE OpROM policy

Controls the execution of UEFI and legacy PXE OpROM.

Launch Storage OpROM policy

Controls the execution of UEFI and legacy storage OpROM.

Launch Video OpROM policy

Controls the execution of UEFI and legacy video OpROM.

Security

Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.					
Main	Advanced	Chipset	Boot	Security	Save & Exit
Password Description If ONLY the Administrator's password is set, then this only limits access to Setup and is only asked for when entering Setup. If ONLY the User's password is set, then this is a power on password and must be entered to boot or enter Setup. In Setup the User will have Administrator rights. The password length must be in the following range: Minimum length 3 Maximum length 20 Administrator Password User Password		Set Administrator Password. → ←: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit			
Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.					

Administrator Password

Sets the administrator password.

User Password

Sets the user password.

Save & Exit

Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.					
Main	Advanced	Chipset	Boot	Security	Save & Exit
Save Changes and Reset Discard Changes and Reset Save Options Save Changes Discard Changes Restore Defaults Save as User Defaults Restore User Defaults Boot Override Launch EFI Shell from filesystem device		Reset the system after saving the changes. ← →: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit			
Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.					

Save Changes and Reset

To save the changes, select this field and then press <Enter>. A dialog box will appear. Select Yes to reset the system after saving all changes made.

Discard Changes and Reset

To discard the changes, select this field and then press <Enter>. A dialog box will appear. Select Yes to reset the system setup without saving any changes.

Save Changes

Save the changes done so far to any of the set up options.

Discard Changes

Discard changes done so far to any of the set up options.

Restore Defaults

To restore and load the optimized default values, select this field and then press <Enter>. A dialog box will appear. Select Yes to restore the default values of all the setup options.

Save as User Defaults

To save changes done so far as user default, select this field and then press <Enter>. A dialog box will appear. Select Yes to save values as user default.

Restore User Defaults

To restore user default to all the setup options, select this field and then press <Enter>. A dialog box will appear. Select Yes to restore user default.

Launches EFI shell from filesystem device

Attempts to launch EFI Shell application (Shellx64. efi) from one of the available filesystem devices.

Updating the BIOS

To update the BIOS, you will need the new BIOS file and a flash utility, AFUDOS.EXE. Please contact technical support or your sales representative for the files.

To execute the utility, type:

A:> AFUDOS BIOS_File_Name /b /p /n
then press <Enter>.

```
C:\AFUDOS>afudos cm9010~1.rom /b /p /n
+-----+
|               AMI Firmware Update Utility(APTIO) v2.38               |
|               Copyright (C)2011 American Megatrends Inc. All Rights Reserved. |
+-----+
Reading file ..... done
FFS checksums ..... ok
Erasing flash ..... done
Writing flash ..... done
Verifying flash ..... done
Erasing NVRAM ..... done
Writing NVRAM ..... done
Verifying NVRAM ..... done
Erasing BootBlock ..... done
Writing BootBlock ..... done
Verifying BootBlock ..... done

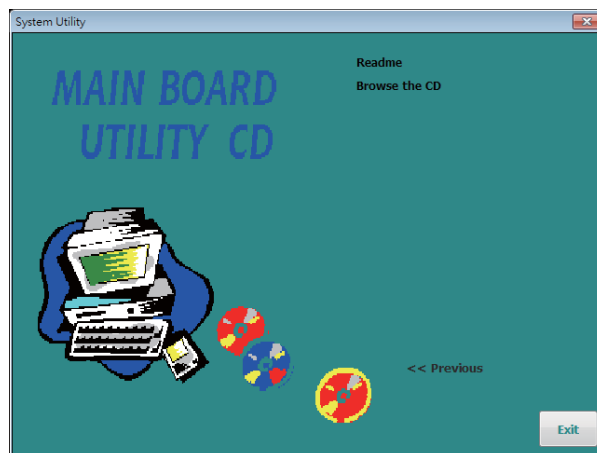
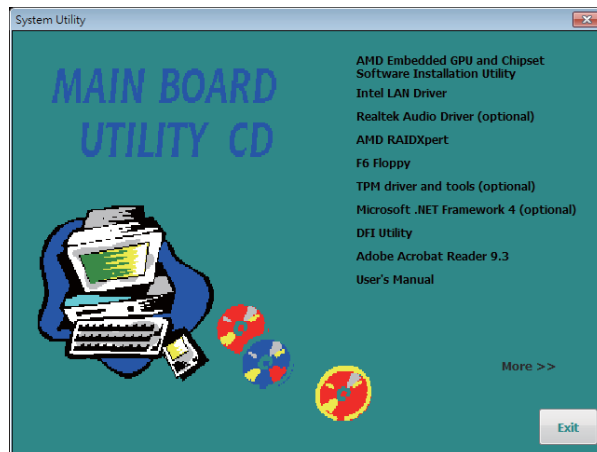
C:\AFUDOS>
```

After finishing BIOS update, please turn off the AC power. Wait about 10 seconds and then turn on the AC power again.

Chapter 5 - Supported Software

The CD that came with the system board contains drivers, utilities and software applications required to enhance the performance of the system board.

Insert the CD into a CD-ROM drive. The autorun screen (Mainboard Utility CD) will appear. If after inserting the CD, "Autorun" did not automatically start (which is, the Mainboard Utility CD screen did not appear), please go directly to the root directory of the CD and double-click "Setup".

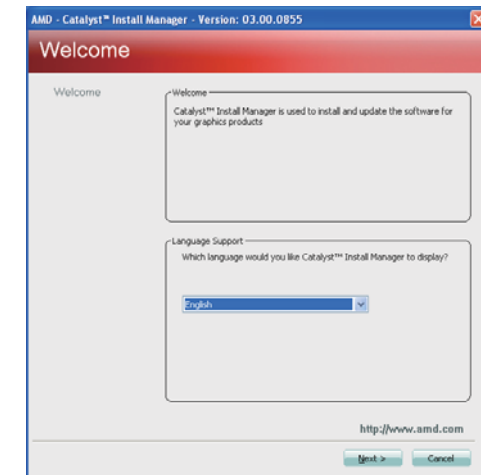


AMD Embedded GPU and Chipset Software Installation

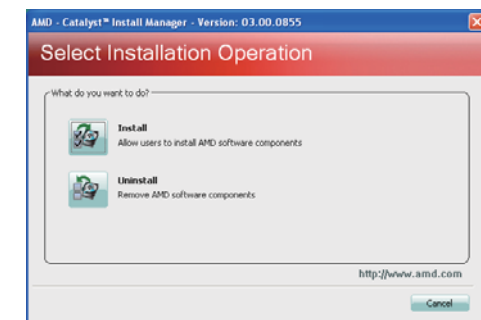
Utility

To install the driver, click "AMD Embedded GPU and Chipset Software Installation Utility" on the main menu.

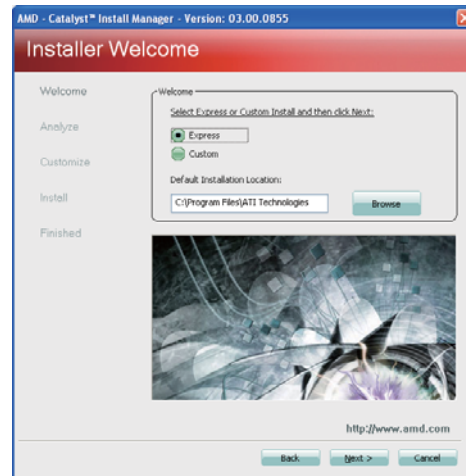
1. Under the Language Support section, select the language you would like the installation to display and then click Next.



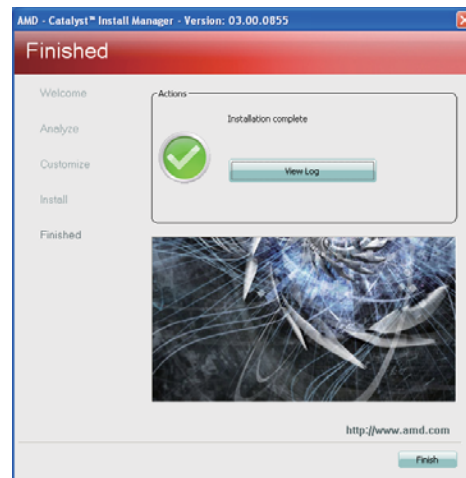
2. Click Install to begin the installation.



- Click Express and then click Next.



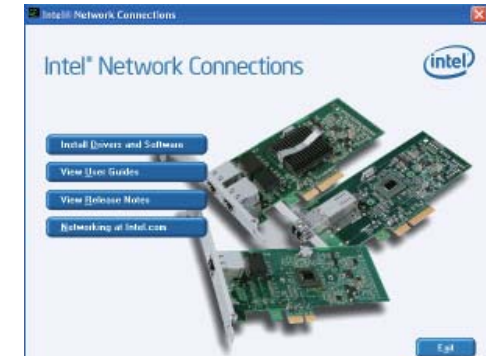
- After completing installation, click Finish.



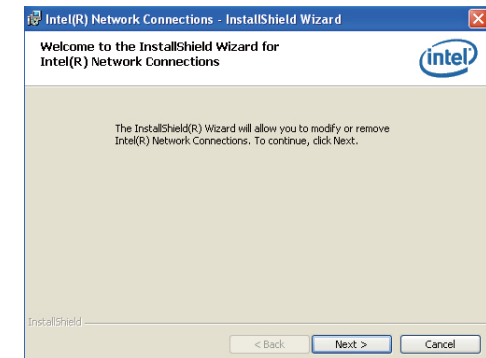
Intel LAN Driver

To install the driver, click "Intel LAN Drivers" on the main menu.

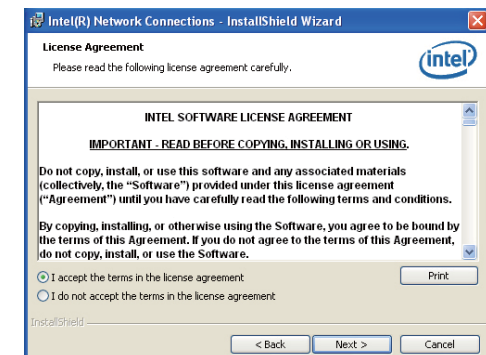
- Setup is ready to install the driver. Click Install Drivers and Software.



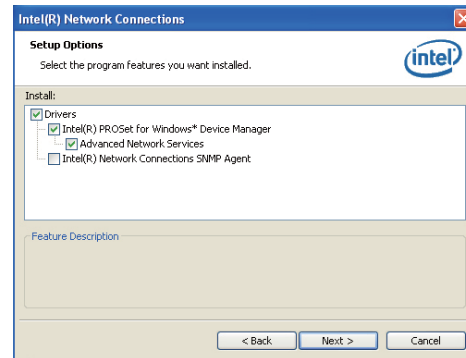
- Setup is now ready to install the LAN driver. Click Next.



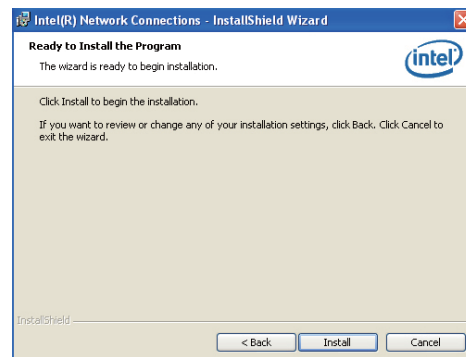
- Click "I accept the terms in the license agreement" then click Next.



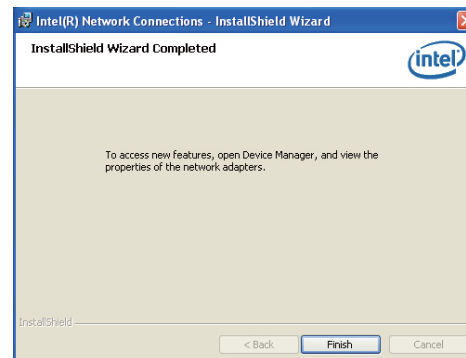
4. Select the program features you want installed then click Next.



5. Click Install to begin the installation.



6. After completing installation, click Finish.



Realtek Audio Driver (optional)

To install the driver, click “Realtek Audio Driver” on the main menu.

1. Setup is now ready to install the audio driver. Click Next.
2. Follow the remainder of the steps on the screen; clicking “Next” each time you finish a step.



3. Click “Yes, I want to restart my computer now” then click Finish.

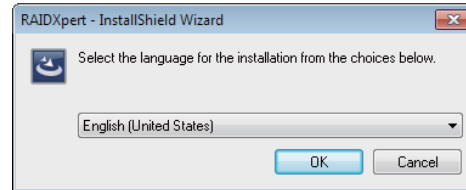
Restarting the system will allow the new software installation to take effect.



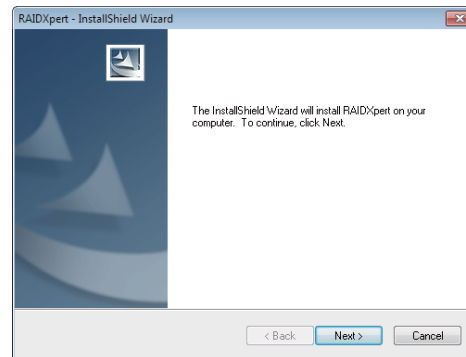
AMD RAIDXpert

To install the driver, click “AMD RAIDXpert” on the main menu.

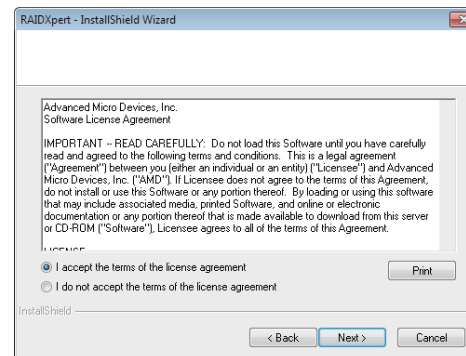
1. Under the Language Support section, select the language you would like the installation to display and then click OK.



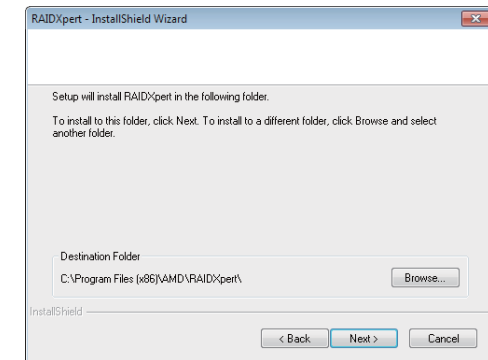
2. Setup is ready to install the driver. Click Next.



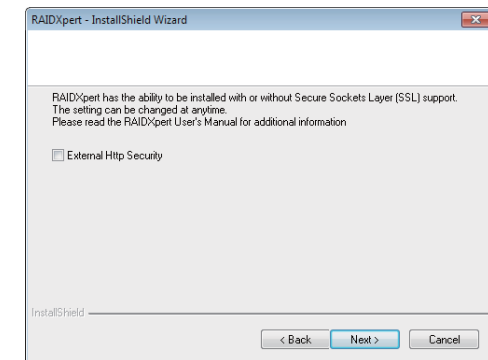
3. Click “I accept the terms of the license agreement” then click Next.



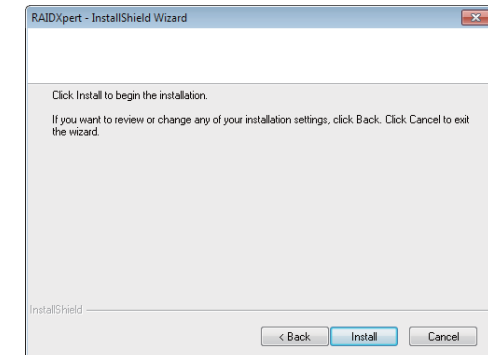
4. Click Next to install or click Browse to select another folder.



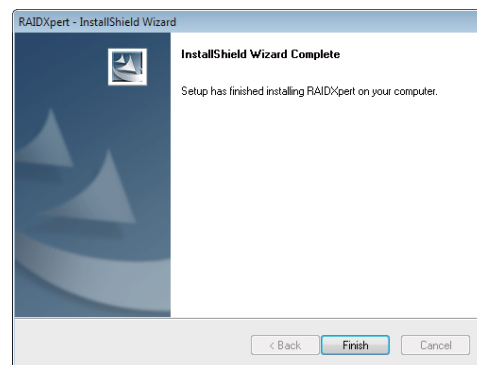
5. Click External Http Security and then click Next.



6. Click Install to begin installation.



7. Click Finish to exit installation.



F6 Floppy

This is used to create a floppy driver diskette needed when you install Windows® XP using the F6 installation method. This will allow you to install the operating system onto a hard drive when in AHCI mode.

1. Insert a blank floppy diskette.
2. Locate for the drivers in the CD then copy them to the floppy diskette. The CD includes drivers for both 32-bit and 64-bit operating systems. The path to the drivers are shown below.

32-bit

CD Drive:\AHCI_RAID\F6FLOPPY\f6flpy32

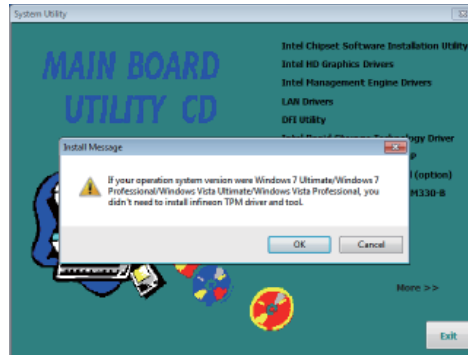
64-bit

CD Drive:\AHCI_RAID\F6FLOPPY\f6flpy64

TPM Driver and Tools (optional)

To install the driver, click “Infineon TPM driver and tool (option)” on the main menu.

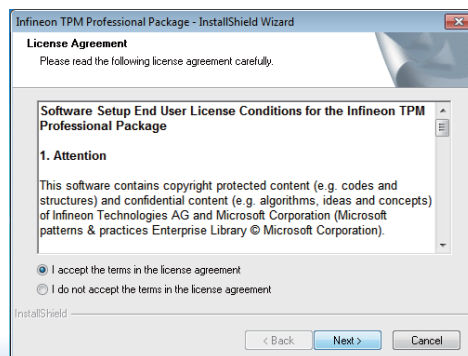
1. Read the message and click OK.



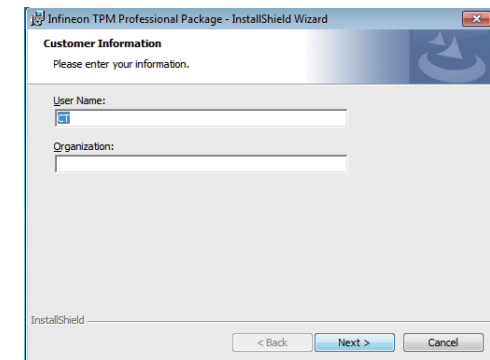
2. The setup program is preparing to install the driver.



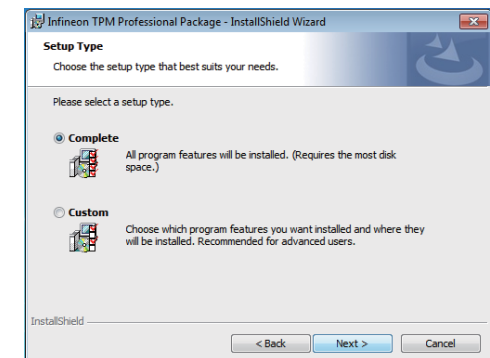
3. Click “I accept the terms in the license agreement” and then click “Next”.



4. Enter the necessary information and then click Next.



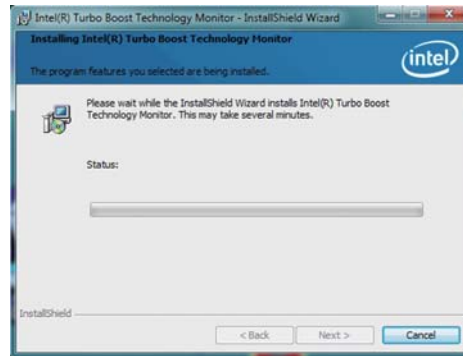
5. Select a setup type and then click Next.



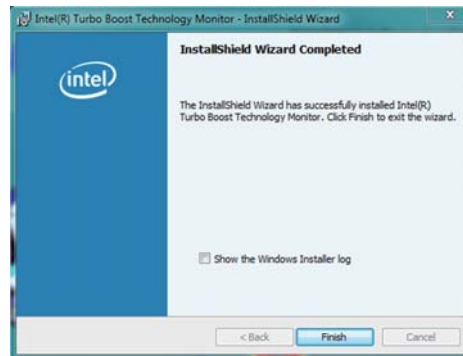
6. Click Install.



7. The setup program is currently installing the software.



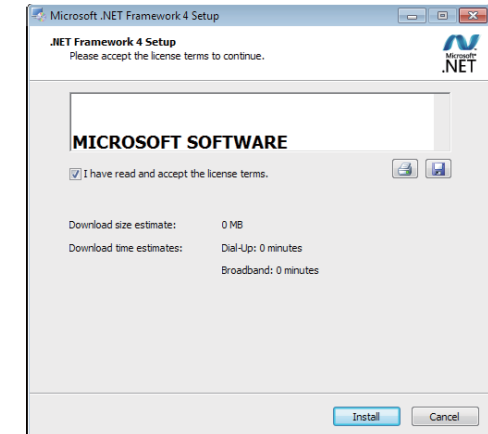
8. Click Finish.



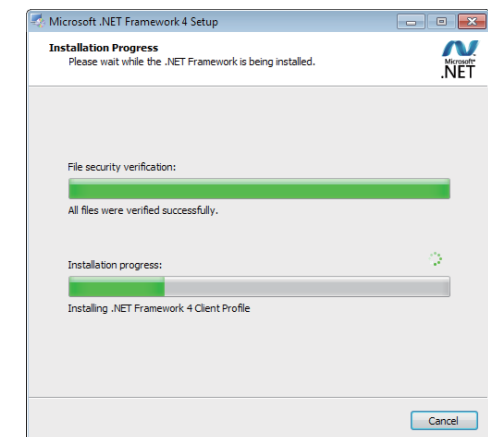
Microsoft .NET Framework 4 (Optional)

To install the driver, click "Microsoft .NET Framework 4" on the main menu.

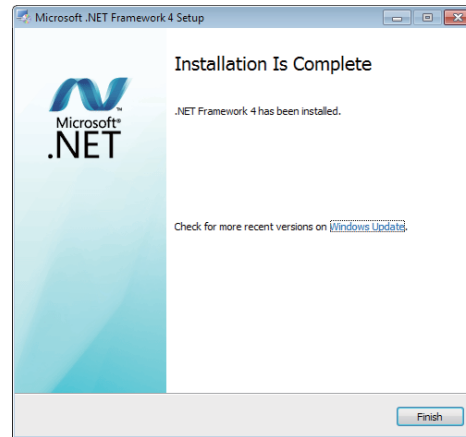
1. Click "I have read and accept the license terms" and then click Install.



2. The setup program is currently installing the software.



3. Click Finish.



DFI Utility

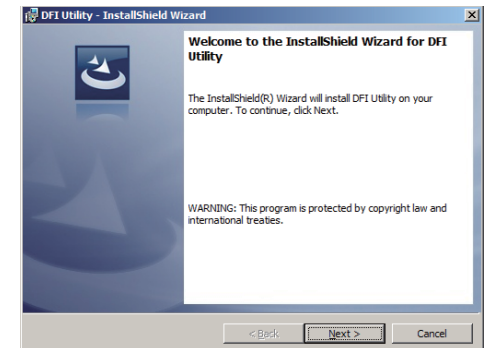
DFI Utility provides information about the board, HW Health, Watchdog, DIO, and Backlight. To access the utility, click "DFI Utility" on the main menu.



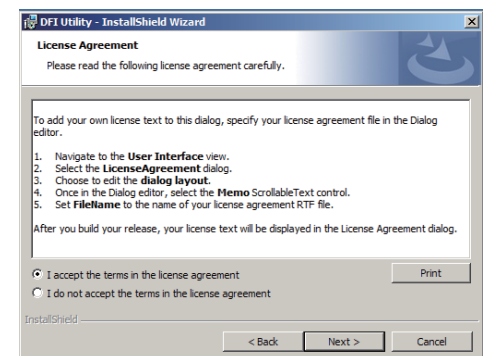
Note:

If you are using Windows 7, you need to access the operating system as an administrator to be able to install the utility.

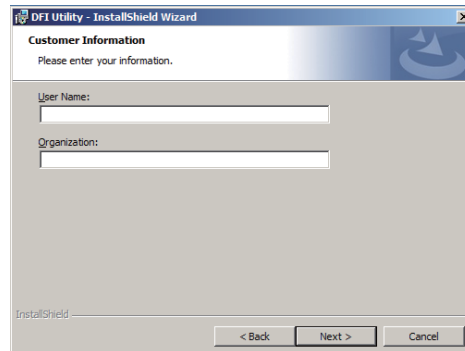
1. Setup is ready to install the DFI Utility driver. Click Next.



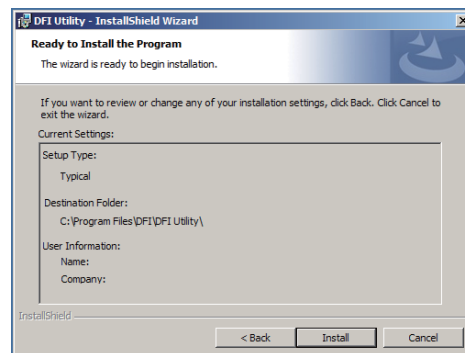
2. Click "I accept the terms in the license agreement" and then click Next.



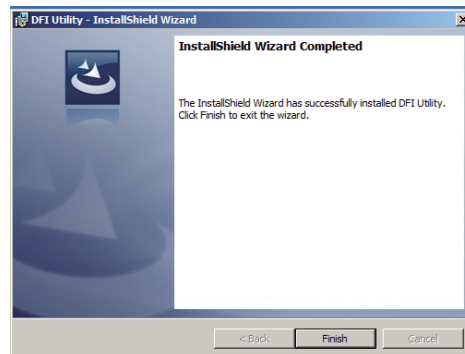
3. Enter "User Name" and "Organization" information and then click Next.



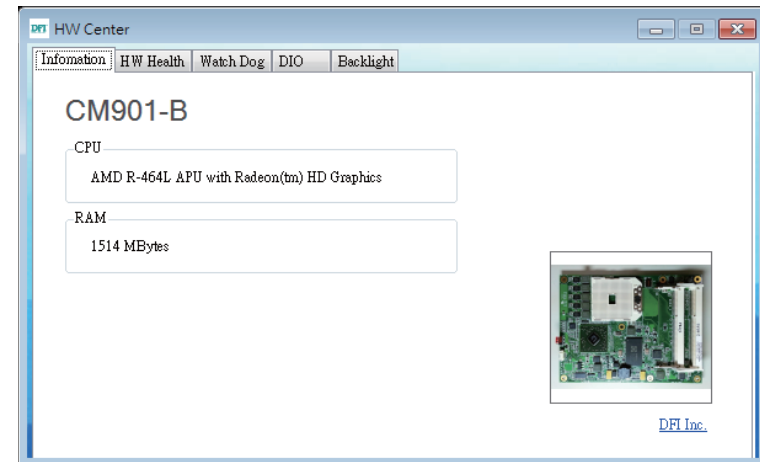
4. Click Install to begin the installation.



5. After completing installation, click Finish.



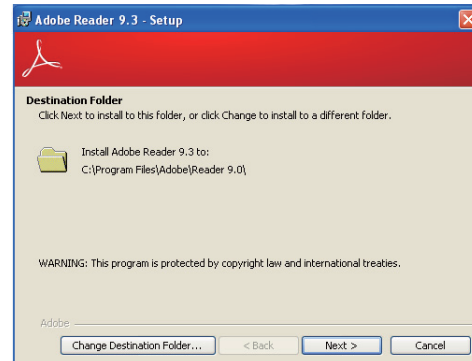
The DFI Utility icon will appear on the desktop. Double-click the icon to open the utility.



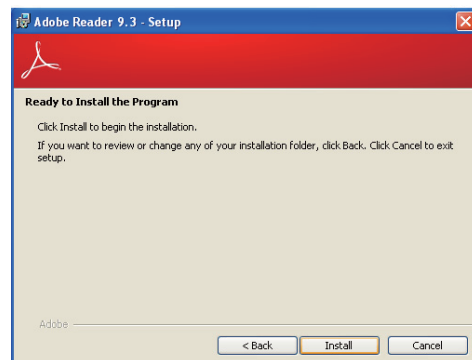
Adobe Acrobat Reader 9.3

To install the reader, click “Adobe Acrobat Reader 9.3” on the main menu.

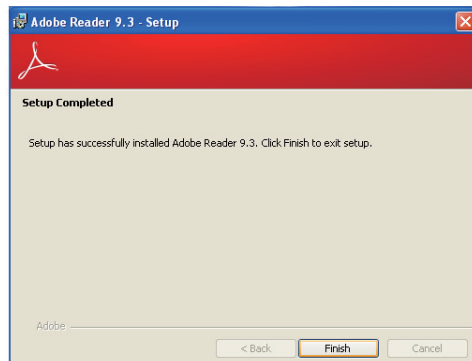
1. Click Next to install or click Change Destination Folder to select another folder.



2. Click Install to begin installation.



3. Click Finish to exit installation.



Appendix A - NLITE and AHCI Installation Guide

nLite

nLite is an application program that allows you to customize your XP installation disc by integrating the RAID/AHCI drivers into the disc. By using nLite, the F6 function key usually required during installation is no longer needed.


Note:

The installation steps below are based on nLite version 1.4.9. Installation procedures may slightly vary if you're using another version of the program.

1. Download the program from nLite's official website.

<http://www.nliteos.com/download.html>

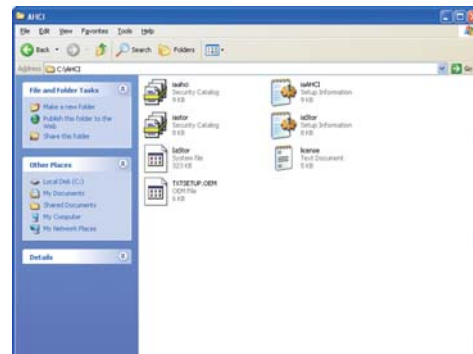
2. Install nLite.


Important:

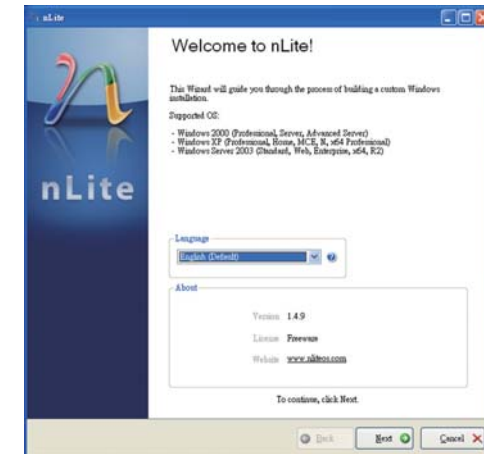
Due to it's coding with Visual.Net, you may need to first install .NET Framework prior to installing nLite.

3. Download relevant RAID/AHCI driver files from Intel's website. The drivers you choose will depend on the operating system and chipset used by your computer.

The downloaded driver files should include iaahci.cat, iaAHCI.inf, iastor.cat, iaStor.inf, iaStor.sys, license.txt and TXTSETUP.OEM.

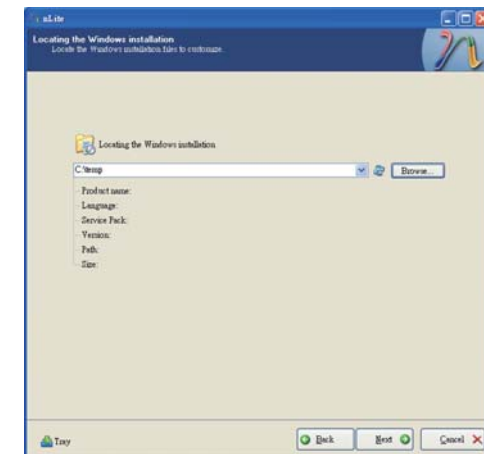


4. Insert the XP installation disc into an optical drive.
5. Launch nLite. The Welcome screen will appear. Click Next.

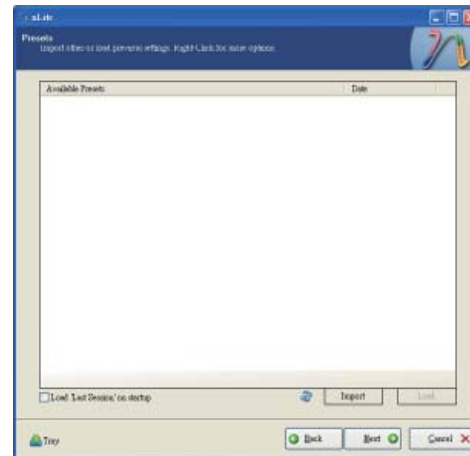


6. Click Next to temporarily save the Windows installation files to the designated default folder.

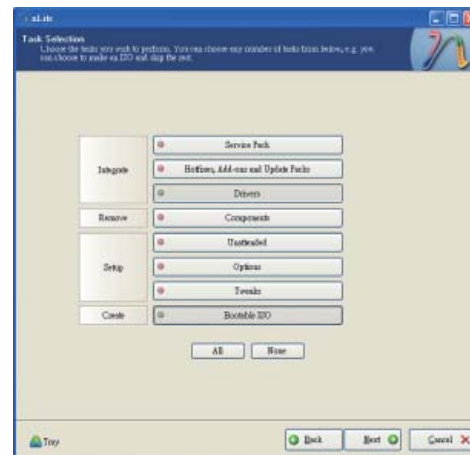
If you want to save them in another folder, click Browse, select the folder and then click Next.



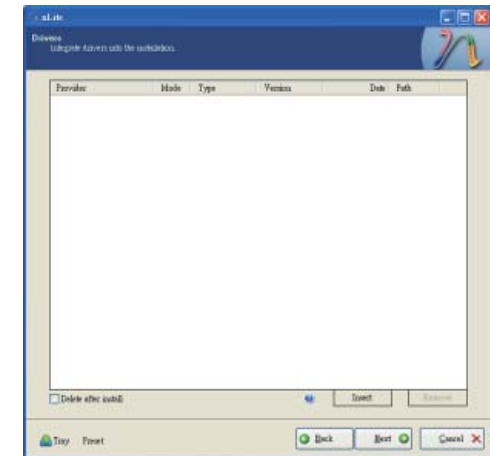
7. Click Next.



8. In the Task Selection dialog box, click Drivers and Bootable ISO. Click Next.

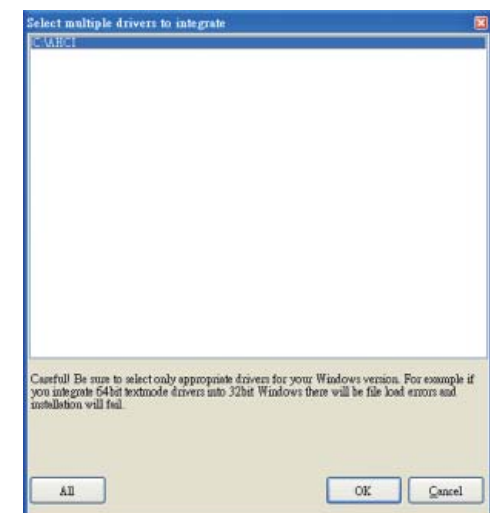


9. Click Insert and then select Multiple driver folder to select the drivers you will integrate. Click Next.



10. Select only the drivers appropriate for the Windows version that you are using and then click OK.

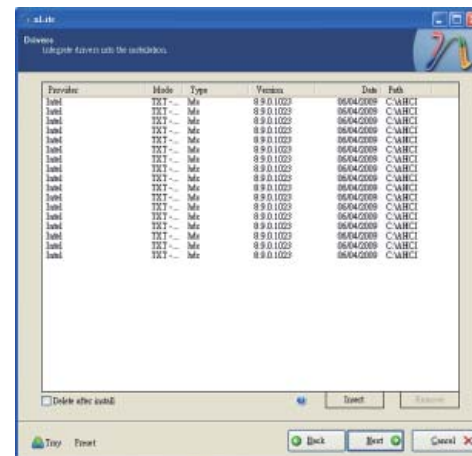
Integrating 64-bit drivers into 32-bit Windows or vice versa will cause file load errors and failed installation.



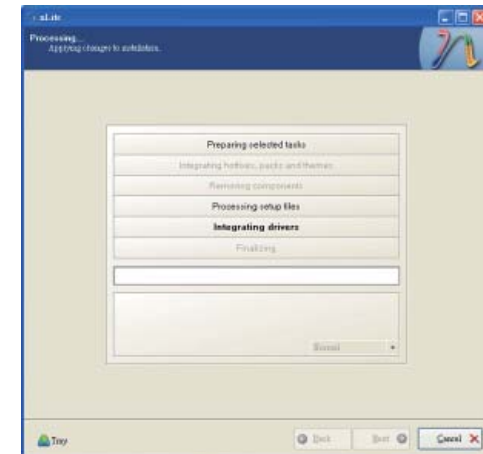
11. If you are uncertain of the southbridge chip used on your motherboard, select all RAID/AHCI controllers and then click OK.



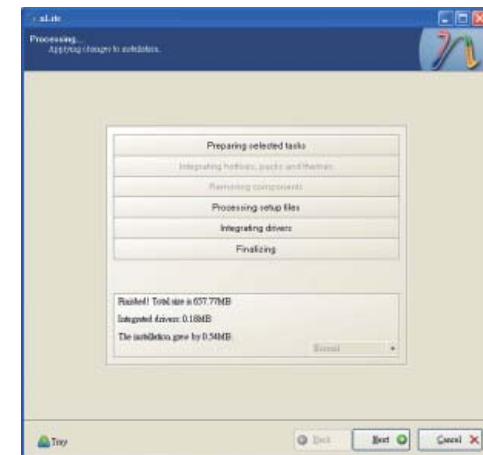
12. Click Next.



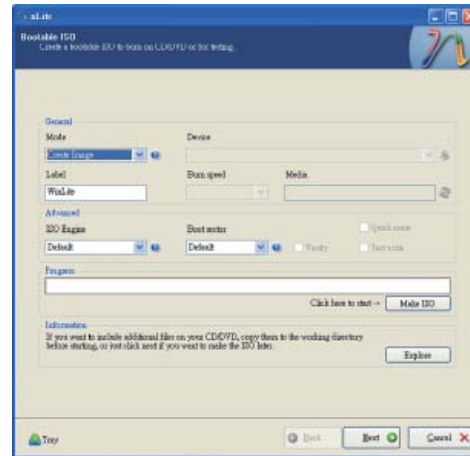
13. The program is currently integrating the drivers and applying changes to the installation.



14. When the program is finished applying the changes, click Next.

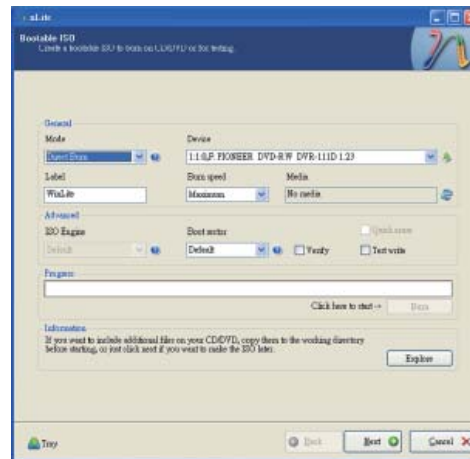


15. To create an image, select the Create Image mode under the General section and then click Next.



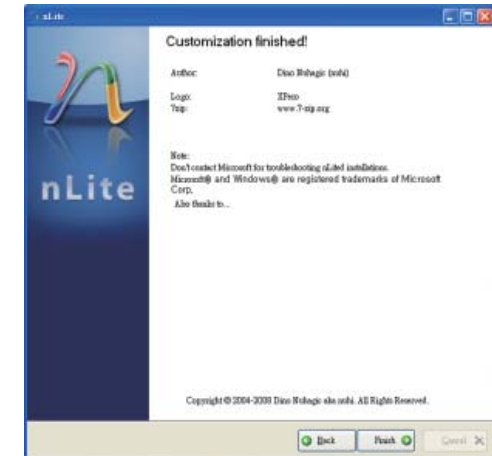
16. Or you can choose to burn it directly to a disc by selecting the Direct Burn mode under the General section.

Select the optical device and all other necessary settings and then click Next.



17. You have finished customizing the Windows XP installation disc. Click Finish.

Enter the BIOS utility to configure the SATA controller to RAID/AHCI. You can now install Windows XP.

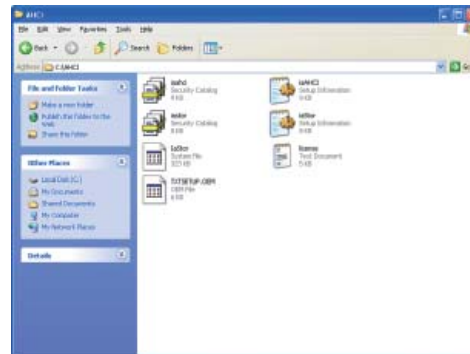


AHCI

The installation steps below will guide you in configuring your SATA drive to AHCI mode.

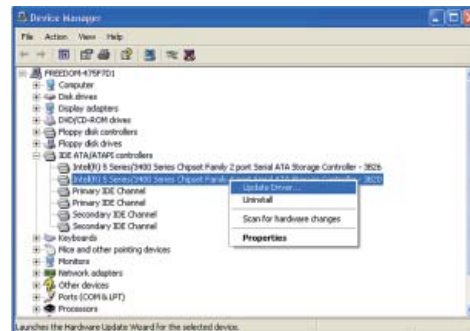
1. Enter the BIOS utility and configure the SATA controller to IDE mode.
2. Install Windows XP but do not press F6.
3. Download relevant RAID/AHCI driver files supported by the motherboard chipset from Intel's website.

Transfer the downloaded driver files to C:\AHCI.



4. Open Device Manager and right click on one of the Intel Serial ATA Storage Controllers, then select Update Driver.

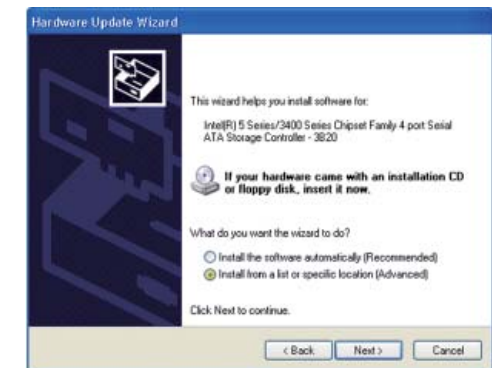
If the controller you selected did not work, try selecting another one.



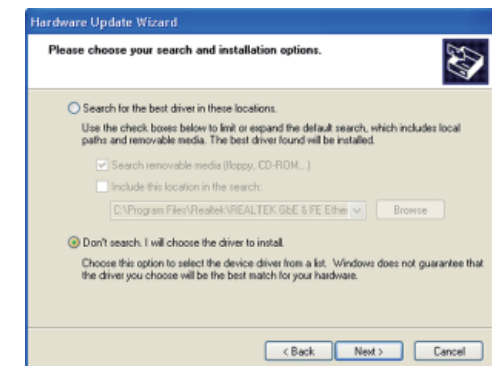
5. In the Hardware Update Wizard dialog box, select "No, not this time" then click Next.



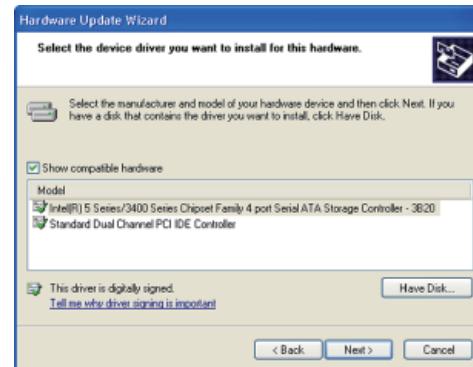
6. Select "Install from a list or specific location (Advanced)" and then click Next.



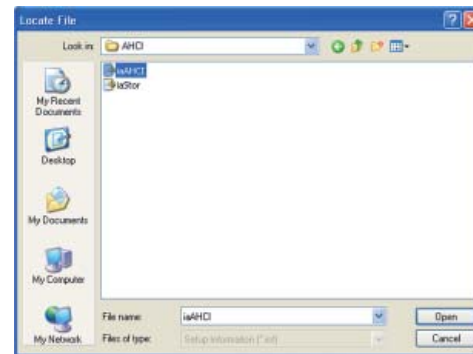
7. Select "Don't search. I will choose the driver to install" and then click Next.



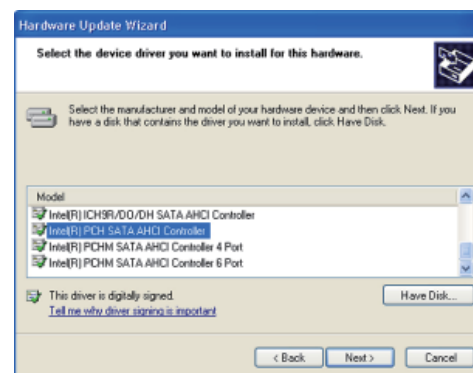
8. Click "Have Disk".



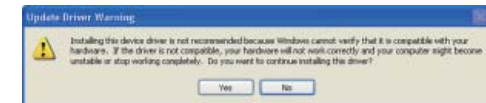
9. Select C:\AHCI\iaAHCI.inf and then click Open.



10. Select the appropriate AHCI Controller of your hardware device and then click Next.

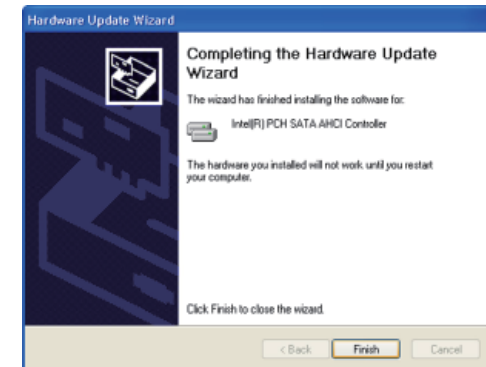


11. A warning message appeared because the selected SATA controller did not match your hardware device.



Ignore the warning and click Yes to proceed.

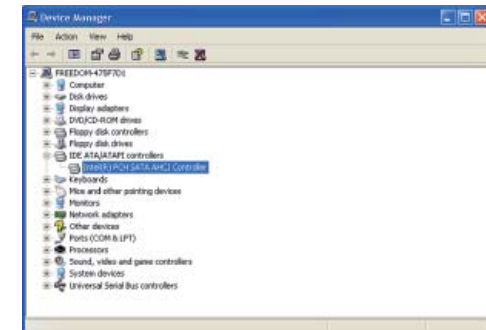
12. Click Finish.



13. The system's settings have been changed. Windows XP requires that you restart the computer. Click Yes.



14. Enter the BIOS utility and modify the SATA controller from IDE to AHCI. By doing so, Windows will work normally with the SATA controller that is in AHCI mode.



Appendix B - Watchdog Sample Code

```
#include <stdio.h>
//-----
#define EC_EnablePort 0x66
#define EC_DataPort 0x62
//-----
void WriteEC(char,int);
void SetWdTime(int,int);
int GetWdTime(void);
//-----
main()
{
    unsigned int countdown;
    unsigned int input,count_h,count_l;

    printf("Input WD Time: ");
    scanf("%d",&input);
    printf("\n");
    count_h=input>>8;
    count_l=input&0x00FF;
    SetWdTime(count_h,count_l);

    while(1)
    {
        countdown = GetWdTime();
        delay(100);
        printf("\rTime Remaining: %d ",countdown);
    }
}
//-----
void SetWdTime(int count_H,int count_L)
{
    //Set Count
    WriteEC(0xB7,count_H); //High Byte
    WriteEC(0xB8,count_L); //Low Byte
    //Enable Watch Dog Timer
    WriteEC(0xB4,0x02);
}
//-----
```

```
int GetWdTime(void)
{
    int sum,data_h,data_l;
    //Select EC Read Type
    outportb(EC_EnablePort,0x80);
    delay(5);
    //Get Remaining Count High Byte
    outportb(EC_DataPort,0xF6);
    delay(5);
    data_h=inportb(EC_DataPort);
    delay(5);
    //Select EC Read Type
    outportb(EC_EnablePort,0x80);
    delay(5);
    //Get Remaining Count Low Byte
    outportb(EC_DataPort,0xF7);
    delay(5);
    data_l=inportb(EC_DataPort);
    delay(5);

    data_h<=8;
    data_h&=0xFF00;
    sum=data_h|data_l;
    return sum;
}
//-----
void WriteEC(char EC_Addr, int data)
{
    //Select EC Write Type
    outportb(EC_EnablePort,0x81);
    delay(5);
    outportb(EC_DataPort,EC_Addr);
    delay(5);
    outportb(EC_DataPort,data);
    delay(5);
}
//-----
```

Appendix C - System Error Message

When the BIOS encounters an error that requires the user to correct something, either a beep code will sound or a message will be displayed in a box in the middle of the screen and the message, PRESS F1 TO CONTINUE, CTRL-ALT-ESC or DEL TO ENTER SETUP, will be shown in the information box at the bottom. Enter Setup to correct the error.

Error Messages

One or more of the following messages may be displayed if the BIOS detects an error during the POST. This list indicates the error messages for all Awards BIOSes:

CMOS BATTERY HAS FAILED

The CMOS battery is no longer functional. It should be replaced.

**Important:**

Danger of explosion if battery incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the battery manufacturer's instructions.

CMOS CHECKSUM ERROR

Checksum of CMOS is incorrect. This can indicate that CMOS has become corrupt. This error may have been caused by a weak battery. Check the battery and replace if necessary.

DISPLAY SWITCH IS SET INCORRECTLY

The display switch on the motherboard can be set to either monochrome or color. This indicates the switch is set to a different setting than indicated in Setup. Determine which setting is correct, either turn off the system and change the jumper or enter Setup and change the VIDEO selection.

Appendix D - Troubleshooting

Troubleshooting Checklist

This chapter of the manual is designed to help you with problems that you may encounter with your personal computer. To efficiently troubleshoot your system, treat each problem individually. This is to ensure an accurate diagnosis of the problem in case a problem has multiple causes.

Some of the most common things to check when you encounter problems while using your system are listed below.

1. The power switch of each peripheral device is turned on.
2. All cables and power cords are tightly connected.
3. The electrical outlet to which your peripheral devices are connected is working. Test the outlet by plugging in a lamp or other electrical device.
4. The monitor is turned on.
5. The display's brightness and contrast controls are adjusted properly.
6. All add-in boards in the expansion slots are seated securely.
7. Any add-in board you have installed is designed for your system and is set up correctly.

Monitor/Display

If the display screen remains dark after the system is turned on:

1. Make sure that the monitor's power switch is on.
2. Check that one end of the monitor's power cord is properly attached to the monitor and the other end is plugged into a working AC outlet. If necessary, try another outlet.
3. Check that the video input cable is properly attached to the monitor and the system's display adapter.
4. Adjust the brightness of the display by turning the monitor's brightness control knob.

The picture seems to be constantly moving.

1. The monitor has lost its vertical sync. Adjust the monitor's vertical sync.
2. Move away any objects, such as another monitor or fan, that may be creating a magnetic field around the display.
3. Make sure your video card's output frequencies are supported by this monitor.

The screen seems to be constantly wavering.

1. If the monitor is close to another monitor, the adjacent monitor may need to be turned off. Fluorescent lights adjacent to the monitor may also cause screen wavering.

Power Supply

When the computer is turned on, nothing happens.

1. Check that one end of the AC power cord is plugged into a live outlet and the other end properly plugged into the back of the system.
2. Make sure that the voltage selection switch on the back panel is set for the correct type of voltage you are using.
3. The power cord may have a "short" or "open". Inspect the cord and install a new one if necessary.

Hard Drive

Hard disk failure.

1. Make sure the correct drive type for the hard disk drive has been entered in the BIOS.
2. If the system is configured with two hard drives, make sure the bootable (first) hard drive is configured as Master and the second hard drive is configured as Slave. The master hard drive must have an active/bootable partition.

Excessively long formatting period.

If your hard drive takes an excessively long period of time to format, it is likely a cable connection problem. However, if your hard drive has a large capacity, it will take a longer time to format.

Serial Port

The serial device (modem, printer) doesn't output anything or is outputting garbled characters.

1. Make sure that the serial device's power is turned on and that the device is on-line.
2. Verify that the device is plugged into the correct serial port on the rear of the computer.
3. Verify that the attached serial device works by attaching it to a serial port that is working and configured correctly. If the serial device does not work, either the cable or the serial device has a problem. If the serial device works, the problem may be due to the onboard I/O or the address setting.
4. Make sure the COM settings and I/O address are configured correctly.

Keyboard

Nothing happens when a key on the keyboard was pressed.

1. Make sure the keyboard is properly connected.
2. Make sure there are no objects resting on the keyboard and that no keys are pressed during the booting process.

System Board

1. Make sure the add-in card is seated securely in the expansion slot. If the add-in card is loose, power off the system, re-install the card and power up the system.
2. Check the jumper settings to ensure that the jumpers are properly set.
3. Verify that all memory modules are seated securely into the memory sockets.
4. Make sure the memory modules are in the correct locations.
5. If the board fails to function, place the board on a flat surface and seat all socketed components. Gently press each component into the socket.
6. If you made changes to the BIOS settings, re-enter setup and load the BIOS defaults.

Appendix E - BIOS Status Code

Status Code Ranges

Status Code Range	Description
0x01 – 0x0F	SEC Status Codes & Errors
0x10 – 0x2F	PEI execution up to and including memory detection
0x30 – 0x4F	PEI execution after memory detection
0x50 – 0x5F	PEI errors
0x60 – 0xCF	DXE execution up to BDS
0xD0 – 0xDF	DXE errors
0xE0 – 0xE8	S3 Resume (PEI)
0xE9 – 0xEF	S3 Resume errors (PEI)
0xF0 – 0xF8	Recovery (PEI)
0xF9 – 0xFF	Recovery errors (PEI)

Standard Status Codes

SEC Status Codes

Status Code	Description
0x0	Not used
Progress Codes	
0x1	Power on. Reset type detection (soft/hard).
0x2	AP initialization before microcode loading
0x3	North Bridge initialization before microcode loading
0x4	South Bridge initialization before microcode loading
0x5	OEM initialization before microcode loading
0x6	Microcode loading
0x7	AP initialization after microcode loading
0x8	North Bridge initialization after microcode loading
0x9	South Bridge initialization after microcode loading
0xA	OEM initialization after microcode loading
0xB	Cache initialization
SEC Error Codes	
0xC – 0xD	Reserved for future AMI SEC error codes
0xE	Microcode not found
0xF	Microcode not loaded

PEI Status Codes

Status Code	Description
Progress Codes	
0x10	PEI Core is started
0x11	Pre-memory CPU initialization is started
0x12	Pre-memory CPU initialization (CPU module specific)
0x13	Pre-memory CPU initialization (CPU module specific)
0x14	Pre-memory CPU initialization (CPU module specific)
0x15	Pre-memory North Bridge initialization is started
0x16	Pre-Memory North Bridge initialization (North Bridge module specific)
0x17	Pre-Memory North Bridge initialization (North Bridge module specific)
0x18	Pre-Memory North Bridge initialization (North Bridge module specific)
0x19	Pre-memory South Bridge initialization is started
0x1A	Pre-memory South Bridge initialization (South Bridge module specific)
0x1B	Pre-memory South Bridge initialization (South Bridge module specific)
0x1C	Pre-memory South Bridge initialization (South Bridge module specific)
0x1D – 0x2A	OEM pre-memory initialization codes
0x2B	Memory initialization. Serial Presence Detect (SPD) data reading
0x2C	Memory initialization. Memory presence detection
0x2D	Memory initialization. Programming memory timing information
0x2E	Memory initialization. Configuring memory
0x2F	Memory initialization (other).
0x30	Reserved for ASL (see ASL Status Codes section below)
0x31	Memory Installed
0x32	CPU post-memory initialization is started
0x33	CPU post-memory initialization. Cache initialization
0x34	CPU post-memory initialization. Application Processor(s) (AP) initialization
0x35	CPU post-memory initialization. Boot Strap Processor (BSP) selection
0x36	CPU post-memory initialization. System Management Mode (SMM) initialization
0x37	Post-Memory North Bridge initialization is started
0x38	Post-Memory North Bridge initialization (North Bridge module specific)
0x39	Post-Memory North Bridge initialization (North Bridge module specific)

0x3A	Post-Memory North Bridge initialization (North Bridge module specific)
0x3B	Post-Memory South Bridge initialization is started
0x3C	Post-Memory South Bridge initialization (South Bridge module specific)
0x3D	Post-Memory South Bridge initialization (South Bridge module specific)
0x3E	Post-Memory South Bridge initialization (South Bridge module specific)
0x3F-0x4E	OEM post memory initialization codes
0x4F	DXE IPL is started
PEI Error Codes	
0x50	Memory initialization error. Invalid memory type or incompatible memory speed
0x51	Memory initialization error. SPD reading has failed
0x52	Memory initialization error. Invalid memory size or memory modules do not match.
0x53	Memory initialization error. No usable memory detected
0x54	Unspecified memory initialization error.
0x55	Memory not installed
0x56	Invalid CPU type or Speed
0x57	CPU mismatch
0x58	CPU self test failed or possible CPU cache error
0x59	CPU micro-code is not found or micro-code update is failed
0x5A	Internal CPU error
0x5B	reset PPI is not available
0x5C-0x5F	Reserved for future AML error codes
S3 Resume Progress Codes	
0xE0	S3 Resume is started (S3 Resume PPI is called by the DXE IPL)
0xE1	S3 Boot Script execution
0xE2	Video repost
0xE3	OS S3 wake vector call
0xE4-0xE7	Reserved for future AML progress codes
0xE8	S3 Resume is started (S3 Resume PPI is called by the DXE IPL)
S3 Resume Error Codes	
0xE8	S3 Resume Failed in PEI
0xE9	S3 Resume PPI not Found
0xEA	S3 Resume Boot Script Error
0xEB	S3 OS Wake Error
0xEC-0xEF	Reserved for future AML error codes
Recovery Progress Codes	
0xF0	Recovery condition triggered by firmware (Auto recovery)
0xF1	Recovery condition triggered by user (Forced recovery)
0xF2	Recovery process started

0xF3	Recovery firmware image is found
0xF4	Recovery firmware image is loaded
0xF5-0xF7	Reserved for future AML progress codes
Recovery Error Codes	
0xF8	Recovery PPI is not available
0xF9	Recovery capsule is not found
0xFA	Invalid recovery capsule
0xFB – 0xFF	Reserved for future AML error codes

PEI Beep Codes

# of Beeps	Description
1	Memory not Installed
1	Memory was installed twice (InstallPeiMemory routine in PEI Core called twice)
2	Recovery started
3	DXE IPL was not found
3	DXE Core Firmware Volume was not found
7	Reset PPI is not available
4	Recovery failed
4	S3 Resume failed

DXE Status Codes

Status Code	Description
0x60	DXE Core is started
0x61	NVRAM initialization
0x62	Installation of the South Bridge Runtime Services
0x63	CPU DXE initialization is started
0x64	CPU DXE initialization (CPU module specific)
0x65	CPU DXE initialization (CPU module specific)
0x66	CPU DXE initialization (CPU module specific)
0x67	CPU DXE initialization (CPU module specific)
0x68	PCI host bridge initialization
0x69	North Bridge DXE initialization is started
0x6A	North Bridge DXE SMM initialization is started
0x6B	North Bridge DXE initialization (North Bridge module specific)
0x6C	North Bridge DXE initialization (North Bridge module specific)
0x6D	North Bridge DXE initialization (North Bridge module specific)
0x6E	North Bridge DXE initialization (North Bridge module specific)
0x6F	North Bridge DXE initialization (North Bridge module specific)

0x70	South Bridge DXE initialization is started
0x71	South Bridge DXE SMM initialization is started
0x72	South Bridge devices initialization
0x73	South Bridge DXE Initialization (South Bridge module specific)
0x74	South Bridge DXE Initialization (South Bridge module specific)
0x75	South Bridge DXE Initialization (South Bridge module specific)
0x76	South Bridge DXE Initialization (South Bridge module specific)
0x77	South Bridge DXE Initialization (South Bridge module specific)
0x78	ACPI module initialization
0x79	CSM initialization
0x7A – 0x7F	Reserved for future AMI DXE codes
0x80 – 0x8F	OEM DXE initialization codes
0x90	Boot Device Selection (BDS) phase is started
0x91	Driver connecting is started
0x92	PCI Bus initialization is started
0x93	PCI Bus Hot Plug Controller Initialization
0x94	PCI Bus Enumeration
0x95	PCI Bus Request Resources
0x96	PCI Bus Assign Resources
0x97	Console Output devices connect
0x98	Console input devices connect
0x99	Super IO Initialization
0x9A	USB initialization is started
0x9B	USB Reset
0x9C	USB Detect
0x9D	USB Enable
0x9E – 0x9F	Reserved for future AMI codes
0xA0	IDE initialization is started
0xA1	IDE Reset
0xA2	IDE Detect
0xA3	IDE Enable
0xA4	SCSI initialization is started
0xA5	SCSI Reset
0xA6	SCSI Detect
0xA7	SCSI Enable
0xA8	Setup Verifying Password
0xA9	Start of Setup
0xAA	Reserved for ASL (see ASL Status Codes section below)

0xAB	Setup Input Wait
0xAC	Reserved for ASL (see ASL Status Codes section below)
0xAD	Ready To Boot event
0xAE	Legacy Boot event
0xAF	Exit Boot Services event
0xB0	Runtime Set Virtual Address MAP Begin
0xB1	Runtime Set Virtual Address MAP End
0xB2	Legacy Option ROM Initialization
0xB3	System Reset
0xB4	USB hot plug
0xB5	PCI bus hot plug
0xB6	Clean-up of NVRAM
0xB7	Configuration Reset (reset of NVRAM settings)
0xB8 – 0xBF	Reserved for future AMI codes
0xC0 – 0xCF	OEM BDS initialization codes
DXE Error Codes	
0xD0	CPU initialization error
0xD1	North Bridge initialization error
0xD2	South Bridge initialization error
0xD3	Some of the Architectural Protocols are not available
0xD4	PCI resource allocation error. Out of Resources
0xD5	No Space for Legacy Option ROM
0xD6	No Console Output Devices are found
0xD7	No Console Input Devices are found
0xD8	Invalid password
0xD9	Error loading Boot Option (LoadImage returned error)
0xDA	Boot Option is failed (StartImage returned error)
0xDB	Flash update is failed
0xDC	Reset protocol is not available

DXE Beep Codes

# of Beeps	Description
4	Some of the Architectural Protocols are not available
5	No Console Output Devices are found
5	No Console Input Devices are found
1	Invalid password
6	Flash update is failed
7	Reset protocol is not available
8	Platform PCI resource requirements cannot be met

ACPI/ASL Status Codes

Status Code	Description
0x01	System is entering S1 sleep state
0x02	System is entering S2 sleep state
0x03	System is entering S3 sleep state
0x04	System is entering S4 sleep state
0x05	System is entering S5 sleep state
0x10	System is waking up from the S1 sleep state
0x20	System is waking up from the S2 sleep state
0x30	System is waking up from the S3 sleep state
0x40	System is waking up from the S4 sleep state
0xAC	System has transitioned into ACPI mode. Interrupt controller is in PIC mode.
0xAA	System has transitioned into ACPI mode. Interrupt controller is in APIC mode.

OEM-Reserved Status Code Ranges

Status Code	Description
0x5	OEM SEC initialization before microcode loading
0xA	OEM SEC initialization after microcode loading
0x1D – 0x2A	OEM pre-memory initialization codes
0x3F – 0x4E	OEM PEI post memory initialization codes
0x80 – 0x8F	OEM DXE initialization codes
0xC0 – 0xCF	OEM BDS initialization codes